VOL. 44 JUNE 1917

NEW YORK BOTANICAL GARDEN LIBRARY

BULLETIN

OF THE

TORREY BOTANICAL CLUB

Editor

ALEXANDER WILLIAM EVANS

Associate Editors

JEAN BROADHURST
JAMES ARTHUR HARRIS
MARSHALL AVERY HOWE
WILLIAM GEORGE MARQUETTE
HERBERT MAULE RICHARDS
ARLOW BURDETTE STOUT
NORMAN TAYLOR

CONTENTS

Contributions to the Elementa flora of the Atlantic coastal plain, XI.—Tennessee (Plate 16) . . . . . EDWARD WILBER BERRY 489

Plants from southern Patagonia collected by Charles Washington Furlong. W. W. ROWLEE 505

Peruvian mosses (Plates 17–20) R. S. WILLIAMS 515

INDEX TO AMERICAN BOTANICAL LITERATURE 529

PUBLISHED THE FIRST YEAR
THE NEW ERA PRINTING COMPANY
LANCASTER, PA.

THE TORREY BOTANICAL CLUB

President

ROBERT A. HARPER, PH.D.

Vice-Presidents

JOHN HENDLEY BARNHART, A.M., M.D.
HERBERT M. RICHARDS, SC.D.

Secretary and Treasurer

BERNARD O. DODGE, PH.D.
Dept. of Botany, Columbia University
New York City

MEETINGS

Meetings twice each month from October to May inclusive: the second Tuesday at 8:00 P.M., at the American Museum of Natural History; the last Wednesday, at 3:30 P.M., in the Museum Building of the New York Botanical Garden.

PUBLICATIONS

All subscriptions and other business communications relating to the publications of the Club should be addressed to the Treasurer, Dr. Bernard O. Dodge, Dept. of Botany, Columbia University, New York City.

Bulletin. Monthly, established 1870. Price, $3.00 a year; single numbers 30 cents. Of former volumes, only 24–39 can be supplied separately; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Manuscripts intended for publication in the BULLETIN should be addressed to the Editor, Osborn Botanical Laboratory, Yale University, New Haven, Connecticut.

Torreya. Monthly, established 1901. Price, $1.00 a year. Manuscripts intended for publication in TORREYA should be addressed to Norman Taylor, Editor, Brooklyn Botanic Garden, Brooklyn, N. Y.

Memoirs. Occasional, established 1889. (See last pages of cover.)

Preliminary Catalogue of Anthophyta and Pteridophyta within 100 miles of New York City, 1888. Price, $1.00

Reprints. Contributors of articles accepted for publication in the BULLETIN should order reprints, if desired, when they return galley proof to the editor. 25 copies of reprints without cover may be had gratis. If cover is wanted, or if more than 25 copies are wanted, they may be ordered through the editor at the following rates from The New Era Printing Co., Lancaster, Pa., the contributor paying for all his reprints.

	2pp	4pp	8pp	12pp	16pp	20pp
25 copies	$ .75	$1.05	$1.30	$1.80	$2.20	$2.50
50 copies	.90	1.20	1.70	2.20	2.50	2.85
100 copies	1.15	1.55	1.95	2.55	2.90	3.20
200 copies	1.70	2.35	2.90	3.75	4.35	4.70

Covers: 25 for 75 cents, additional covers 1 cent each.

Plates for reprints, 40 cents each per 100.

Vol. 43 No. 6

BULLETIN

OF THE

TORREY BOTANICAL CLUB

JUNE, 1916

Contributions to the Mesozoic flora of the Atlantic coastal plain, XI.—Tennessee*

EDWARD WILBER BERRY

(WITH PLATE 16)

Tennessee west of the river of that name is physiographically and geologically a part of the Atlantic Coastal Plain. The Upper Cretaceous deposits of Tennessee outcrop in a belt of considerable width which extends across the state from north to south immediately west of the Tennessee River. In McNairy and Hardin counties on the south this belt is about sixty-eight miles in width, but the beds become thinner or are overlapped by the Eocene to the northward so that in Henry County on the northern boundary the Cretaceous belt is only about ten miles in width.

The Upper Cretaceous of Tennessee when compared with that of Alabama and Mississippi is seen to be much thinner. According to the nomenclature adopted for Tennessee† the sequence from the top downward is as follows:

Ripley formation.... { McNairy sand member
Unnamed member

* The last previous contribution of this series appeared in the Bull. Torrey Club 40: 295–300. 1914.

† Stephenson, L. W. U. S. Dept. Int. Geol. Surv. Professional Paper 81. 1914.

[The BULLETIN for May (43: 207–282. *pl. 10–15*) was issued June 16, 1916.]

Selma chalk ..... { Representing a tongue of chalky material extending northward from about the middle of the Selma chalk of western Alabama

Eutaw formation.... Coffee sand member
Tuscaloosa formation.

No fossil plants have been recorded from these beds in Tennessee except *Salex eutawensis* Berry, which is recorded from the Coffee sand near Parsons, Decatur County, Tennessee. While the materials are prevailingly littoral or sublittoral in character with numerous small clay lenses, the bulk of the deposits are sands, and while these are often lignitic or contain petrified wood, determinable fossil plants are rare. The apparent scarcity of fossil plants is due in a measure to lack of exploration, since this area has not yet been surveyed as thoroughly as the balance of the Cretaceous of the Eastern Gulf area. The country is thinly settled, and is for the most part without large towns, railroads or good wagon roads.

That eventually a considerable flora will be known from the Cretaceous of Tennessee is indicated by the results of a single season's detailed work in McNairy and Hardin Counties by Mr. Bruce Wade, a student of the Johns Hopkins University, working under the auspices of the Tennessee Geological Survey.

Determinable plants were obtained by him during the summer of 1915 at two horizons. The first of these is in the McNairy sand member of the Ripley formation and comes from two localities—one in the big cut on the Southern Railway west of Cypress and the other two and one half miles southwest of the town of Selmer, both in McNairy County. The second is in the Coffee sand member of the Eutaw formation and comes from the classic outcrop of the Upper Cretaceous at Coffee Bluff on the Tennessee River in Hardin County, first described by Safford in 1864.*

The flora collected by Mr. Wade is too limited to warrant a botanical analysis but it is of considerable interest stratigraphically and it possesses an especial botanical interest since hardly any-

* Safford, J. M. Am. Jour. Sci. II. 37: 360–372. 1864.

thing is known of the later Upper Cretaceous floras of the Atlantic Coastal Plain. The forms identified with their geographical and geological ranges are shown in the following table:

	Coffee Sand, Tennessee	McNairy Sand, Tennessee	Lower Eutaw, Alabama, Georgia	Cusseta Sand	Black Creek Formation	Magothy Formation	Woodbine Formation	Tuscaloosa Formation	Dakota Formation	Raritan Formation	Emscherian of Europe	Turonian of Europe	Colorado Group	Montana Group
Phragmites Prattii	×	...	×	...	×	...	...	...	...	...	...	...	...	...
Sabalites sp.	...	×	...	...	...	...	...	...	...	...	...	...	...	...
Myrica ripleyensis	...	×	...	...	...	...	...	...	...	...	...	...	...	...
Salix eutawensis	×	...	×	...	×	...	...	...	...	...	...	...	...	...
Dryophyllum gracile	...	×	...	...	...	...	...	...	...	...	×	...	...	...
Ficus crassipes	×	...	×	...	×	×	...	×	×	...	...	...	...	...
Ficus Krausiana	×	...	×	...	×	×	...	×	×	...	...	×	...	...
Ficus ovatifolia	×	...	×	...	×	×	...	×	...	×	...	...	...	...
Dewalquea Smithi	×	...	...	...	×	...	...	×	...	...	...	...	...	...
Cissites crispus	...	×	...	...	...	...	...	...	...	...	×	...	...	...
Bauhinia ripleyensis	...	×	...	×	...	...	...	...	...	...	...	...	...	...
Manihotites georgiana	×	×	×	×	×	...	...	...	...	...	...	...	...	...
Sterculia Snowii tennesseensis	...	×	...	...	...	...	...	...	...	...	...	...	...	...
Pterospermites carolinensis	×	...	...	...	×	...	...	×	...	...	...	...	...	...
Laurophyllum elegans	×	...	...	...	×	×	...	...	×	...	...	...	...	...
Cinnamomum Heerii	×	...	×	...	×	×	×	×	×	...	...	...	...	...
Cinnamomum sp.	...	×	...	...	...	...	...	...	...	...	...	...	...	...
Malapoenna horrellensis	...	×	×	...	×	...	...	...	...	...	...	...	...	...
Myrcia havanensis	...	×	×	...	...	...	...	...	...	...	...	...	...	...
Eugenia (?) *anceps*	...	×	...	...	...	...	...	...	...	...	...	...	...	...
Andromeda Wardiana	×	...	×	...	...	...	...	...	×	...	...	...	...	...
Andromeda novae-caesareae	×	...	...	×	×	×	×	×	...	×	...	...	...	...
Diospyros primaeva	×	...	×	...	×	×	×	×	×	×	...	×	...	...
Halymenites major	×	×	...	...	...	...	...	...	...	...	...	...	×	×

This flora as at present known comprises twenty-four forms, of which *Sabalites* sp., *Cinnamomum* sp., and *Eugenia* (?) *anceps* are poorly characterized. *Halymenites major* is probably not a plant but it is a very characteristic object common in the western United States in the Colorado and Montana series.

The Tennessee Cretaceous flora is remarkable in not showing any traces of ferns or gymnosperms. When the prevailing coarseness of the sediments is considered the absence of ferns is not to be wondered at, but such sediments usually contain an abundance of coniferous twigs and with further exploration these should be discovered. The presence of considerable amber both

in the Coffee sand and in the McNairy sand is a sure indication of conifers, and the petrified wood found at Coffee Bluff is also coniferous and represents an undetermined species of *Cupressinoxylon*. *Araucaria bladenensis*, which is so common in the Black Creek and Lower Eutaw and ranges upward into the Cusseta sand, has not been discovered in Tennessee.

If the two Tennessee horizons be considered separately it will be noted that the Coffee sand flora as at present known consists of fourteen named species and an unidentified *Cupressinoxylon*. None of these are new. It is contrasted with the McNairy sand flora by having but one common species (*Manihotites georgiana*) and by a considerable number of forms that come up from older horizons. Thus it has four species that originate in the Raritan, although none of these are characteristic of the Raritan but of slightly younger horizons. It has three species common to the Woodbine sand, five to the Dakota sandstone, seven to the Magothy formation, and eight to the Tuscaloosa formation. Nine of the Coffee sand forms are common to the basal Eutaw and twelve of the fourteen species are found in the Black Creek formation of the Carolinas. The Coffee sand has not yielded an invertebrate fauna, although on stratigraphic grounds Stephenson refers it to the *Exogyra ponderosa* zone. The present collections unquestionably confirm this reference. Its exact position in this zone is not directly determinable since the possible equivalents of the Coffee sand in Mississippi and Alabama are strictly marine formations without fossil plants, so that we have the familiar but much involved problem of comparing a section in one area with plants and without invertebrates, with a section in an adjoining area containing invertebrates but no plants. While the interpretations resulting from the two classes of evidence are in substantial agreement the paleobotanical evidence would seem to indicate that the Coffee sand may be slightly older than Stephenson (*op. cit.*) postulates, unless we are to assume that 86 per cent. of the Coffee sand flora comes up from older horizons and then becomes extinct in the relatively short interval between the Coffee and the McNairy sand. This is of course possible and future work may demonstrate its truth, but in the present state of our knowledge it seems improbable. Two of the Coffee sand

species, *Ficus Krausiana* and *Diospyros primaeva*, occur in both the Cenomanian and Turonian of Europe.

The McNairy sand flora consists of eleven species, five of which are new and peculiar to this horizon. Only one is common to the Coffee sand, although two additional are found in the basal Eutaw of Alabama or Georgia. Two are common to the Cusseta sand and two occur in the Black Creek formation. The distinctness of the McNairy sand flora is further emphasized by the total absence of any Raritan, Woodbine, Tuscaloosa, Dakota or Magothy species. Singularly enough it has no known elements in common with the Cretaceous floras of the Rocky mountain or Great Plains provinces. Compared with European Upper Cretaceous floras it has two species, *Dryophyllum gracile* and *Cissites crispus*, common to the Emscherian of Prussia and Bohemia and not found elsewhere. While this is not sufficient evidence upon which to base intercontinental correlation it is not without significance, especially in view of the fact that the McNairy sand has not yet furnished any elements common to the fairly abundant floras of the Campanian and Maestrichtian of Europe.

POALES

POACEAE

PHRAGMITES Trinius

PHRAGMITES PRATTII Berry

Phragmites sp., Berry, Bull. Torrey Club **34**: 190. *pl. 11, f. 5.* 1907.

Phragmites Prattii Berry, Bull. Torrey Club **37**: 191. 1910; U. S. Dept. Int. Geol. Surv. Professional Paper 84: 28, 109. 1914.

Grasslike leaf fragments referred to this species have been described from several localities in the Black Creek formation of the Carolinas and from the lower Eutaw of Georgia. Identical remains occur in the Upper Eutaw of Tennessee.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

ARECALES

PALMAE

SABALITES Saporta

SABALITES sp.

Fragments of leaves of a large fan palm are present in the basal Ripley beds of Benton County, and in the McNairy sand of McNairy County, Tennessee. They indicate large flabellate leaves with numerous rays 1.5–2 cm. broad with an illy-defined midrib and closeset parallel lateral veins. The texture is coriaceous.

The material is very fragmentary and is altogether insufficient for specific diagnosis. It is in my judgment distinct from the so-called *Sabalites Grayanus* Lesquereux of the Montana Group, *Sabalites magothiensis* Berry of the Magothy formation or *Sabalites carolinensis* Berry of the Middendorf beds of South Carolina.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. One half mile from Camden, Benton County; two and one half miles southwest of Selmer, McNairy County, Tennessee.

MYRICALES

MYRICACEAE

MYRICA Linné

Myrica ripleyensis sp. nov.

Leaves of medium size, linear-lanceolate in outline with a gradually cuneate base. Length about 13 cm. Maximum width, in the middle part of the leaf, about 1.75 cm. Margins conspicuously serrate-toothed, the teeth somewhat irregular in size and disposition; distad they are reduced and close-set. They increase in size proximad until in the median and basal part of the leaf, they are large and triangular the intervening sharp sinuses reaching nearly to the midrib and closely simulating our recent *Comptonia* in character. Texture coriaceous. Petiole not preserved, presumably short and stout. Midrib stout, flexuous. Secondaries numerous, diverging from the midrib at wide angles.

about 70 degrees, every third or fourth one straighter than the rest and running to a marginal tooth, the intervening ones somewhat more curved and camptodrome.

This is an exceedingly well marked species, quite distinct from previously described forms and resembles closely some of the leaves of our existing *Comptonia peregrina* (Linné) Coulter. It is also much like some of the European Tertiary forms about which so much controversy raged in times past as to whether they were myricaceous or proteaceous.* For example some of the forms of *Comptonia vindobonensis* (Ettingshausen) Berry are close to the present species. A somewhat similar form is described by Velenovsky from the Bohemian Cretaceous as *Dryandra cretacea*,† and another by Unger from the Cretaceous of Transylvania as *Comptonites antiquus*.‡ These are both generically distinct from the present species as shown by their characteristic habit.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. Camden-Paris Road, thirteen miles northwest of Camden, Benton County; two and one half miles southwest of Selmer, McNairy County, Tennessee.

SALICALES

SALICACEAE

SALIX Linné

SALIX EUTAWENSIS Berry

Salix eutawensis Berry, Bull. Torrey Club 37: 193. *pl. 22, f. 1–11.* 1910; U. S. Dept. Int. Geol. Surv. Professional Paper 84: 109. *pl. 19, f. 3.* 1914.

This very characteristic willow, represented by both leaves and fruits in North Carolina is also found in Georgia. It is

* The reader who wishes additional information on this point should consult my paper on Living and Fossil Species of *Comptonia*. Amer. Nat. 40: 485–520. *pl. 1–4.* 1906.

† Velenovsky. Fl. Böhm. Kreidef. 2: 1. *pl. 1. f. 1–5.* 1883.

‡ Unger. Ueber einige fossile Pflanzenreste aus Siebenbürgen und Ungarn. Sitz. K. Akad. Wiss. Wien 51: 2. *pl. 1, f. 1.* 1865.

not present in the material collected by Mr. Wade but was collected some years ago by Mr. Stephenson at the following locality.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Cut on The North Carolina and St. Louis Railway, east of Parsons, Decatur County, Tennessee.

FAGALES

FAGACEAE

DRYOPHYLLUM Debey

DRYOPHYLLUM GRACILE Debey

Dryophyllum gracile Debey, Feuilles querciformes d'Aix-la-Chapelle. Compte rendu Congres bot. et hort. Brussels 10. *f. 10, 11.* 1881.

Quercus pseudodrymeja Velenovsky, Fl. Böhm. Kreidef. **2**: 17. *pl. 2, f. 21, 22.* 1883; **4**: 13. *pl. 7, f. 10.* 1885. Bayer, Sitz. k. Böhm. Gesell. Wiss. 1896: 10. Fric, Archiv. Naturw. Landes. Böhm. **10**: 75. *pl. 100.* 1897.

Leaves oblonglanceolate in outline, with a cuneate base and a gradually narrowed tip. Length about 12 cm. Maximum width, in median part of leaf, ranging from 1.75 cm. to 2.5 cm. Petiole missing. Texture subcoriaceous. Margin with regularly spaced, fairly prominent, nearly straight-serrate teeth. Midrib stout, prominent on the lower surface of the leaf. Secondaries thin, regularly spaced, about fifteen craspedodrome pairs, branching from the midrib at angles of forty-five degrees or more, curving regularly upward, subparallel, terminating in the marginal teeth. Tertiaries thin, partly percurrent and partially alternating, joined midway between adjacent secondaries by a zigzag tertiary. [FIG. 6.]

This well-marked species is represented by five specimens in the small collection from the Cretaceous of Tennessee. None of these are complete, each showing about two thirds of a leaf, enough to demonstrate the identity with the European form. The type material came from the Emscherian where it is recorded from Aachen, Rhenish Prussia; Tannenberg, Bohemia and Kieslingswalde, Silesia, all at about the same horizon, probably representing the Santonian substage of the Emscherian.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. Big Cut on Southern Railway near Cypress, two and one half miles southwest of Selmer, McNairy County, Tennessee.

URTICALES

MORACEAE

FICUS Linné

FICUS CRASSIPES (Heer) Heer

Proteoides crassipes Heer, Fl. Foss. Arct. 3^2: 110. *pl. 31, f. 6–8.* 1874.

Ficus crassipes Heer, *Ibid.* 6^2: 70. *pl. 17, f. 9a; pl. 24, f. 1, 2.* 1882; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 37, 110. *pl. 10, f. 12; pl. 12, f. 8–10.* 1914.

The leaves of this species as they occur in the southern Coastal Plain are narrowly lanceolate with gradually narrowed apex and base, about 15 centimeters in length by 2.5 centimeters in greatest width, and resemble *Ficus atavina* Heer in outline but are relatively narrower. The texture is coriaceous and the midrib and petiole are extraordinarily stout in many specimens. The secondary venation when seen is of the usual camptodrome type with relatively long, ascending, curved secondaries.

This species was described originally from the Atane beds of western Greenland, the first rather fragmentary specimens collected having suggested the genus *Proteoides*. It was subsequently recorded from the Dakota sandstone of Kansas by Lesquereux. In the Atlantic Coastal Plain it is found in the Magothy and Black Creek formations, including the Middendorf member of the latter, and it is especially common in clays of the Tuscaloosa formation of Alabama. It occurs in the basal beds of the Eutaw formation in Georgia and the present occurrence extends its range upward to near the top of the latter formation.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

FICUS KRAUSIANA Heer

Ficus Krausiana Heer, Neue Denks. Schw. Gesell. **23**: 15. *pl. 5, f. 3–6.* 1869; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 38, 110. *pl. 11, f. 4–7; pl. 19, f. 4.* 1914.

Leaves of large size, ovate lanceolate in outline, broadest at or below the middle. Apex and base acutely pointed, the apex

often extended and attenuated. Petiole and midrib stout Secondaries regular, open, thin, ascending, camptodrome, branching from the midrib at angles of forty-five degrees or more. Texture coriaceous or subcoriaceous. Length about 17 cm. Greatest width about 4 cm.

This species was described by Heer from Moletein in Moravia (Cenomanian), and it has been subsequently identified from a large number of American localities. In the West it occurs in the Dakota sandstone of Kansas and Colorado; in the East it is common from Martha's Vineyard and Block Island to Alabama and is present between these limits in Maryland, North Carolina and South Carolina. It occurs in the lower Eutaw of Georgia and the present record extends its range upward to near the top of the Eutaw.

Associated with this species at the type locality in Moravia are similar leaves which were described by Professor Heer as a different species, *Ficus Mohliana*. These are somewhat larger with a more sparse secondary venation. It seems probable that these merely represent the somewhat larger leaves of *Ficus Krausiana*, but they are not united with it in view of the lack of positive evidence, because *Ficus Mohliana* has priority and this would involve the change of name of this well-known type and horizon marker. In both North and South Carolina fruits are found associated with this species, but whether they are related to it or to some of the other rather numerous species of *Ficus* which occur at the same localities can not be determined.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

FICUS OVATIFOLIA Berry

Ficus ovata Newberry, Mon. U. S. Geol. Surv. **26**: 70. *pl. 24, f. 1–3*. 1896. Not Don, 1802–3.

Ficus ovatifolia Berry, Bull. Torrey Club **36**: 253. 1909.

Leaves ovate in outline, extended above into a narrow, usually pointed apex. Length 8–12 cm. Greatest width, which is in the basal part of the leaf, 4–7 cm. Base broadly rounded and in many specimens slightly decurrent. Margins entire. Primaries, three from the base, the midrib somewhat stouter than the lateral primaries. Secondaries camptodrome.

This species is closely allied to the Raritan species *Ficus Woolsoni* Newberry, differing primarily in its greater elongation and in the tendency of the former to a cordate outline. *Ficus ovatifolia* was described originally from the Raritan formation of New Jersey. It is present in the Black Creek formation of North Carolina and in the lower part of the Eutaw formation in Georgia.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

RANALES

RANUNCULACEAE (?)

DEWALQUEA Saporta & Marion

DEWALQUEA SMITHI Berry

Dewalquea Smithi Berry, Torreya 10: 36. *f. 1.* 1910; U. S. Dept. Int. Geol. Surv. Professional Paper 84: 41. *pl. 8, f. 3–9.* 1914.

Leaves palmately decompound, the petiole dividing into three principal branches, the angle of divergence varying from twenty to sixty degrees, and the two lateral branches forking at an acute angle 1–2 cm. above their base. The middle leaflet lanceolate in outline, being widest in its central part and tapering almost equally to the acute apex and base. Length 7.5–16 cm. Greatest width 1–4 cm. Margin entire or serrate, usually entire below and serrate in the apical three-fourths, sometimes with large aqualine-serrate teeth. Midrib stout. Secondaries regular, subopposite, parallel; about twenty pairs, branching from the midrib at angles varying from forty-five to seventy degrees, usually about fifty degrees, curving upward and running to the marginal teeth, or camptodrome. The base of the leaflet extends downward to within 2 or 3 mm. of the forks of the petiole. Lateral leaflets more or less inequilateral, usually somewhat smaller than the middle leaflet. The internal lateral leaflet is lanceolate, the outer lamina starting at or very near the point where the lateral branch of the petiole forks. The inner lamina, however, extends downward almost to the base of the lateral branch, making the base markedly inequilateral. In general outline, marginal and venation characters, it is identical with the middle leaflet. The outer lateral leaflet is also somewhat inequilateral, but less so than the internal lateral leaflet, the internal lamina starting at

or near the fork and its outer lamina extending more or less below the fork. Marginal and venation characters as in the other leaflets.

This handsome species is abundantly represented in the Middendorf formation of South Carolina, mostly by terminal leaflets. It is common in the Upper Tuscaloosa of Alabama where nearly complete leaves have been collected. It is markedly distinct from the American species of *Dewalquea* previously described, all of which were apparently tripartite. Among the European forms it is quite similar to the Senonian species *Dewalquea insignis* Hos. & v. d. Marck, which is, however, entirely distinct.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

ROSALES

CAESALPINIACEAE

BAUHINIA Linné

Bauhinia ripleyensis sp. nov.

Leaves of medium size, more or less bilobate, but much less deeply divided than in the preceding species, obovate in general outline. Length along the midrib 4.5 cm. From apex of lobes to base 6.7 cm. Width across upper part of the leaf 5.5 cm. Apical sinus open, extending about one fourth of the distance toward the base of the leaf, its margins at the tip of the midrib forming an angle of about 90°, curving slightly upward and then conspicuously outward to the pointed tips of the lobes which are directly laterally. Outer margins of the leaf full and rounded, becoming straight toward the broadly cuneate base. Midrib of medium size. Lateral primaries branching from the base at angles with the midrib of about 25 degrees, of medium size, curved upward and then outward, and running to the tips of the lobes. They give off four or five camptodrome secondaries on the outside and two or three on the inside. The midrib, in its upper half, also gives off one or two secondaries on each side. Leaf substance somewhat coriaceous. [FIG. 1.]

This species, which is sparingly represented in the argillaceous greensand marls along Cowikee Creek in Alabama, associated with

shallow water or estuarine mollusks of the Ripley formation, and in the McNairy sand of Tennessee, is markedly distinct from any described species of *Bauhinia*. It is much smaller and less deeply divided than *Bauhinia gigantea* Newberry or *Bauhinia alabamensis* Berry, and is much less ornate in character. It is, on the other hand, much larger than *Bauhinia marylandicus* Berry of the Magothy formation in the Maryland area. It differs from all of these American Cretaceous species in its pointed, outwardly-directed lobes, but is not unlike a number of existing species of this genus.

OCCURRENCE: RIPLEY FORMATION. Right bank of Cowikee Creek, one-eighth of a mile above mouth, Barbour County, Alabama. MCNAIRY SAND MEMBER. Two and one half miles southwest of Selmer, McNairy County, Tennessee.

GERANIALES

EUPHORBIACEAE

MANIHOTITES Berry

MANIHOTITES GEORGIANA Berry

Manihotites georgiana Berry, Bull. Torrey Club **37**: 507. *f. 1, 2.* 1910; U. S. Dept. Int. Geol. Surv. Professional Paper 84: 114. *pl. 22; pl. 23; pl. 24, f. 4, 5.* 1914.

This remarkable large-leafed species has been somewhat fully described and figured recently. The type was based on nearly perfect material from the Lower Eutaw of McBrides Ford, Georgia. This species has also been recorded from the Cusseta sand member of the Ripley formation at Buena Vista, Georgia. It is present in the Black Creek formation of North Carolina and Mr. Wade's recent collections contain fragmentary but characteristic specimens from both the Eutaw and Ripley formations of Tennessee.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County. RIPLEY FORMATION, MCNAIRY SAND MEMBER. Two and one half miles southwest of Selmer, McNairy County, Tennessee.

RHAMNALES

VITACEAE

CISSITES Heer

CISSITES CRISPUS Velenovsky

Cissites crispus Velenovsky, Fl. Böhm. Kreidef. **4**: 12. *pl. 4, f. 6* 1885. Not Newberry, 1896, Berry, 1906, 1911.

The present species was identified from the Raritan of New Jersey by Newberry and from the Magothy by Berry but neither occurrence represents the European form so that recently I made them the basis of a new species, *Cissites Newberryi*.*

A perfectly distinct small-leafed form which appears to be identical with the Bohemian type is present in the Ripley of Tennessee. It differs from *Cissites Newberryi* in its relatively shorter and broader form, its crenate instead of serrate or dentate teeth, its less ascending secondaries and its cordate base.

The type and only other known occurrence of *Cissites crispus* is the Chlomeker beds (Emscherian) of Bohemia.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. Two and one half miles southwest of Selmer, McNairy County, Tennessee.

MALVALES

STERCULIACEAE

STERCULIA Linné

Sterculia Snowii tennesseensis var. nov.

Leaf bilobate with a bluntly pointed base and gradually narrowed acuminate recurved apical lobes. Length about 11 cm. Width of entire basal part of leaf 2.5–2.75 cm. Width of lobes 1.1–1.6 cm. Margins entire. Texture subcoriaceous. Sinus extending half way to base or less, open, narrowly rounded. Midrib stout, flexuous. Lateral primary stout, diverging from midrib at an acute angle about 3 cm. above the base. Secondaries thin, largely immersed, diverging from primaries at wide angles at regular intervals, arching in a camptodrome manner near the margins. [FIG. 5.]

* Berry, E. W. Md. Geol. Surv. Upper Cret. 856. 1916.

This striking form is unfortunately represented by only two specimens both of which are bilobate, although it, like so many fossil and existing species of *Sterculia*, may well have varied from entire to trilobate. Among previously described fossil forms it may be compared with the Magothy species *Sterculia minima* Berry, a smaller more variable form, or with the Dakota sandstone species *Sterculia mucronata* Lesquereux and *Sterculia Snowii* Lesquereux. The latter while often much larger and at times with five lobes is extremely variable. Two named varieties have already been recognized and the general character and venation of the Tennessee form leads me to conclude that it represents another variety of this protean species.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. Two and one half miles southwest of Selmer, McNairy County, Tennessee.

PTEROSPERMITES Heer

PTEROSPERMITES CAROLINENSIS Berry

Pterospermites carolinensis Berry, Bull. Torrey Club **34**: 198. *pl. 14, f. 2.* 1907.

This characteristic species, which was described from the Black Creek formation of North Carolina, is also not uncommon in the Tuscaloosa formation of Alabama. The present collections extend its range upward to the Coffee Sand Member of the Eutaw formation in which it occurs at Coffee Bluff, Hardin County, Tennessee.

THYMELEALES

LAURACEAE

LAUROPHYLLUM Goeppert

LAUROPHYLLUM ELEGANS Hollick

Laurophyllum elegans Hollick, Mon. U. S. Geol. Surv. **50**: 81. *pl. 27, f. 1–5.* 1907; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 53. *pl. 12, f. 6.* 1914.

Leaves elongate-lanceolate, somewhat flexuous, about 12–13 cm. in length by about 2 cm. in greatest width, which is about

midway between the apex and the base; from this point they narrow gradually apically into an attenuated acuminate, usually curved, tip; and basally into a long, narrowly cuneate base. Midrib and petiole stout. Secondaries numerous, usually less close and somewhat coarser than in *Laurophyllum nervillosum*, branching from the midrib at an acute angle below, which becomes more open above the base of the leaf; they are usually more curved than in *L. nervillosum* and more distinctly camptodrome. Tertiaries transverse throughout.

The species is certainly known from the upper Raritan at South Amboy, New Jersey, and is common in the Magothy formation of Maryland. It is sparsely represented in the Black Creek beds of North Carolina and is not uncommon in the Middendorf beds of South Carolina.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

CINNAMOMUM Sprengel

CINNAMOMUM HEERII Lesquereux

Cinnamomum Heerii Lesquereux, Cretaceous Flora 84. *pl. 28, f. 11.* 1874; Mon. U. S. Geol. Surv. **17**: 105. *pl. 15, f. 1.* 1892; Newberry, Mon. U. S. Geol. Surv. **35**: 100. *pl. 17, f. 1–3.* 1898; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 118. *pl. 21, f. 8.* 1914.

Leaves coriaceous, entire, ovate in outline, more or less attenuated apically. Base broadly rounded. Primaries three, stout, suprabasilar. Secondaries camptodrome.

The exact status of this species is made out with difficulty. In typical specimens it is clearly distinct from *Cinnamomum Newberryi* Berry in its more regular outline and venation, broader form, more rounded base, and stouter suprabasilar primaries. Other remains have been referred to *Cinnamomum Heerii* which are not typical in some of these distinctive characters, and the well-known variation of the leaves of *Cinnamomum* renders a satisfactory solution of the problem difficult. It does, however, characterize the somewhat younger beds represented in the west by the Dakota sandstone and the Woodbine sand and in the Coastal Plain by the Magothy formation of the north and the Black Creek and Tuscaloosa formations of the south. In the

lower Eutaw of Georgia it is represented by fragments showing the coriaceous texture, broad base, and suprabasilar primaries of the species.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

CINNAMOMUM sp.

A characteristic *Cinnamomum* of uncertain specific identity occurs in the McNairy sand member of the Ripley formation at the locality two and one half miles southwest of Selmer in McNairy County, Tennessee.

MALAPOENNA Adanson

MALAPOENNA HORRELLENSIS Berry

Malapoenna horrellensis Berry, Bull. Torrey Bot. Club **37**: 198. *pl. 24, f. 1–9.* 1910; U. S. Dept. Int. Geol. Surv. Professional Paper 84: 118. 1914.

Leaves ovate-lanceolate, about 8 cm. long by 2.5 cm. in greatest width; broadest at the evenly rounded or slightly acute base, narrowing gradually upward, the apex narrow and extended but obtusely pointed. Leaf substance thin but persistent, evidently coriaceous in life, as these leaves occur abundantly at a locality where all the vegetable remains were thoroughly macerated before entombment. Secondaries four to six pairs, subopposite, curved upward, camptodrome, branching from the midrib at an acute angle, the lowest pair branching from the top of the petiole and extending upward halfway to the apex or farther, giving the leaf a triple-veined appearance. Perhaps they should be termed lateral primaries, although they are much finer than the fairly stout midrib. The next pair of secondaries branch at a less acute angle, a considerable distance above the base, one third to one half the distance to the apex. Tertiary venation typically lauraceous.

The present species may possibly be confused with *Cinnamomum Heerii* when only the basal part of the leaf is found, but the general proportions and characters of the whole leaf are perfectly distinct.

The genus *Malapoenna* has more than one hundred existing species, chiefly of the Oriental tropics, and is well represented in

the fossil state from the Dakota and Magothy formations upward. It is especially well represented in the Paleocene of Europe and in the Shoshone group of America. Of the two species in the Dakota sandstone of the West, one occurs in the Tuscaloosa formation at Cottondale, Alabama, and the other in the Magothy formation of New Jersey.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. Near Cypress and two and one half miles southwest of Selmer, McNairy County, Tennessee.

MYRTALES

MYRTACEAE

MYRCIA DeCandolle

Myrcia havanensis sp. nov.

Leaves linear-lanceolate in outline, falcate, about 9 cm. in length by 1 cm. in maximum width, which is in the lower half of the leaf. Margins entire. Apex gradually narrowed, acuminate. Base narrowly pointed, decurrent. Petiole very stout, tapering upward, 1.75 cm. in length. Midrib stout, curved. Secondaries numerous, thin, somewhat irregularly spaced, 2–6 mm. apart, branching from the midrib at angles of about forty degrees, running with but slight curvature to the well-marked and nearly straight longitudinal vein which forms a marginal hem less than one half a millimeter from the margin. Texture coriaceous.

The present species is very close to some of the numerous forms which have been from time to time referred to *Eucalyptus Geinitzi* (Heer) Heer. It is, however, distinct from the latter, especially when compared with Heer's type or with the more typical American material. In general it is a smaller leaf with a larger and longer petiole, an outline less inclined toward ovate, and relatively much more produced apically. It is typically *Myrcia*-like in all of its characters. It is found in both the Ripley and Eutaw formations in Alabama and Tennessee.

OCCURRENCE: EUTAW FORMATION. Two miles south of Havana, Hale County, Alabama. RIPLEY FORMATION, MCNAIRY SAND MEMBER. Two and one half miles southwest of Selmer, Big Cut on Southern Railway near Cypress, McNairy County; Camden, Benton County, Tennessee.

EUGENIA Linné

Eugenia (?) anceps sp. nov.

Coriaceous leaves of variable size and form, lanceolate or oblong lanceolate. Base and apex equally acuminate or apex somewhat more attenuated. Margins entire. Length 7.75–10 cm. Maximum width, midway between the apex and the base, 11–18 mm. Petiole enlarged, short and stout, 3–4 mm. in length. Midrib stout. Secondaries thin, immersed in the leaf substance. [FIGS. 2–4.]

This species is referred with much doubt to *Eugenia*. The material is abundant but poorly preserved and these leaves resemble a variety of forms referred to such genera as *Salix*, *Laurophyllum*, etc.

Eugenia has a species in the Tuscaloosa formation of Alabama, another in the Dakota sandstone, and is not uncommon in the Eocene of the Mississippi embayment area.

OCCURRENCE: RIPLEY FORMATION, MCNAIRY SAND MEMBER. Two and one half miles southwest of Selmer, McNairy County, Tennessee.

ERICALES

ERICACEAE

ANDROMEDA Linné

ANDROMEDA NOVAE-CAESAREAE Hollick

Andromeda novae-caesareae Hollick; Newberry, Mon. U. S. Geol. Surv. **26**: 121. *pl. 42, f. 9–12, 28–31.* 1896; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 58, 120. *pl. 14, f. 5, 6; pl. 24, f. 1.* 1914.

Leaves small, thick, and entire, with stout petioles and midribs and obscure secondary venation which is immersed in the thick lamina. Length 2.5–5.0 cm. Width varying from 0.9–1.3 cm. Venation, where visible, showing numerous parallel, camptodrome, relatively long and thin secondaries which branch from the midrib at acute angles. While the majority of these leaves are equally acuminate at both ends there is considerable variation in this respect, and a well-marked tendency is shown in a considerable number of specimens which are relatively broader,

especially in the upper half, toward an obtusely rounded apex, the termination of the midrib showing as a small mucronate point. The base in these forms gradually narrows to the stout petiole.

This species is found as early as the uppermost Raritan in the New Jersey area and is also common in the overlying Magothy. It is exceedingly common throughout the Black Creek formation of the Carolinas and has also been recorded from the Cusseta sand member of the Ripley formation in Georgia. It occurs also in the Woodbine of Texas and the Tuscaloosa of Alabama so that it is apparently a form with a wide stratigraphic range.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

ANDROMEDA WARDIANA Lesquereux

Andromeda Wardiana Lesquereux, Mon. U. S. Geol. Surv. **17**: 119. *pl. 64, f. 17*. 1892; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 120. *pl. 24, f. 3*. 1914.

Leaf elliptical in outline, entire. Apex and base equally narrowed but the apex bluntly rounded. Length 5.3 cm. Greatest width, which is halfway between the apex and the base, 2.3 cm. Midrib thin. Secondaries not made out. In the type they are thin, diverging at an angle of about forty degrees and camptodrome.

The type material came from the Dakota sandstone of Ellsworth County, Kansas. The Georgia material which came from the basal beds of the Eutaw formation shows a leaf which is a trifle larger but which in its general proportions and outline is identical with the western form, and there can be no doubt of their identity.

It is quite possible, in fact probable, that this species is not distinct from *Andromeda tenuinervis* Lesquereux, which, if the form referred to it by Hollick is correctly identified, approaches it closely in size. The two differ somewhat in texture and in the degree of acuteness of the apex, but whether these features are of specific value or not is an open question. The Tennessee material extends the range of this species to the upper part of the Eutaw formation.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

EBENALES

EBENACEAE

DIOSPYROS Linné

DIOSPYROS PRIMAEVA Heer

Diospyros primaeva Heer, Phyll. Crét. d. Nebr. 19. *pl. 1, f. 6, 7.* 1866; Berry, U. S. Dept. Int. Geol. Surv. Professional Paper 84: 61. *pl. 11, f. 3; pl. 14, f. 12, 13.* 1914.

Leaves oblong-ovate in outline, variable according to age, ranging from 3–15 cm. in length, by 1.3–5 cm. in greatest width, which is in the middle part of the leaf. Apex acute or obtuse. Base cuneate. Margins entire. Petiole rather long and very stout. Midrib also stout. Secondaries branching from the midrib at usually acute angles, subopposite or alternate, parallel, camptodrome. Tertiaries forming polygonal areoles whose relative prominence is one of the features of this species.

This species, which is quite suggestive of the modern *Diospyros virginiana* Linné, was described by Heer from the Dakota group of Nebraska nearly half a century ago. It has proved to be a most wide-ranging form, having been identified at both the Atane and Patoot horizons in Greenland; in the Cenomanian of Saxony and the Turonian of Bohemia; from various localities within the Dakota group, including its southern extension, the Woodbine formation of Texas; and with the exception of the fragments from Marthas Vineyard and Long Island, which are of questionable identity, it is present in either the Raritan, or Magothy, or homotaxial formations from New Jersey to Alabama. Its most marked character is the prominence of its tertiary areolation.

OCCURRENCE: EUTAW FORMATION, COFFEE SAND MEMBER. Coffee Bluff, Hardin County, Tennessee.

INCERTAE SEDIS

HALYMENITES MAJOR Lesquereux

Halymenites major Lesquereux, Tertiary Flora 38. *pl. 1, f. 7, 8.* 1878.

These very common objects, frequently considered as fucoids, are abundant in the western United States in sandy beds ranging

in age from the Colorado group to the Eocene. They were long considered typical of the Fox Hills horizon but are now known from both older and younger beds and characterize sandy ferruginous sediments. Typical material is abundant in the Coffee sand member of the Eutaw formation at Coffee Bluff, Hardin County, Tennessee, and this is the first record of these objects in the coastal plain. It occurs also in sands of the Lower Ripley and in the McNairy sand of McNairy County, but in a very friable condition and these last horizons are not represented by collected material.

JOHNS HOPKINS UNIVERSITY,
BALTIMORE, MARYLAND

Explanation of plate 15

FIG. 1. *Bauhinia ripleyensis* Berry. More perfect specimen from Ripley, Barbour County, Alabama, to illustrate McNairy sand species.

FIGS. 2–4. *Eugenia* (?) *anceps* Berry. McNairy sand two and one half miles southwest of Selmer, Tennessee.

FIG. 5. *Sterculia Snowii tennesseensis* Berry. McNairy sand, two and one half miles southwest of Selmer, Tennessee.

FIG. 6. *Dryophyllum gracile* Debey. McNairy sand, near Cypress, Tennessee.

Plants from southern Patagonia collected by Charles Wellington Furlong

W. W. Rowlee

Introduction

During the summer of 1907–1908 (November to March), Mr. Furlong collected a very interesting set of specimens representing the vegetation of southern Patagonia. The plants for the most part grew in the vicinity of the southern shore of Lake Argentine. Some, however, were secured in the journey overland from the mouth of the Gallegos river. Mr. Furlong was working primarily on problems of ethnology and the story of his journey is told in Harper's Magazine for June, 1910, and May, 1911.

The vegetation of the southern end of South America has been a subject for investigation for many years. One of Darwin's most valuable works is his account of his voyage to South America. He ascended the Santa Cruz River, the outlet of Lake Argentine, far enough to see the Andes, but not far enough to discover the Lake. Before Darwin's time, however, collections had been made especially along the Straits of Magellan; many have collected in the same region more recently. Few travellers, however, even up to the present time have explored the inland region of southern Patagonia.

If we except the so-called Antarctic Continent of the ice bound south polar region, it is the most southerly continental land. The plants inhabiting it have long been known to show affinity with the flora of Australia, New Zealand, and other Antarctic islands. This relation has led to the belief that there once existed a continent in the Southern Hemisphere which connected more or less completely these southern land masses. The results of antarctic explorations in recent years have tended to confirm this theory. Fossil remains of various gymnosperms and angiosperms have been discovered which represent the ancestral forms of closely related species now widely separated geographically.

Lake Argentine is located in southern Patagonia about latitude 51 degrees. Its latitude and longitude south correspond almost exactly to the latitude and longitude north of Lake Mistassinica in southern Labrador. The continents of North America and South America have generally speaking the same shape. Their configuration in relation to the tropics, however, is reversed. South America narrows southward until in the latitude of the region under discussion, it is about 200 miles wide; on the other hand North America widens towards the north until in the latitude of southern Labrador, it stretches out to more than three thousand miles. Arboreal vegetation extends as far south in South America as it does north in North America. In fact the climate of corresponding latitudes south seems to be less detrimental to plant-life than corresponding latitudes in North America. This is probably due to the influence of the oceans.

It has long been known that the only strip of deciduous forest in the southern continent is along the east side of the Andes in temperate South America. In the north temperate zone deciduous forests form a very dominating feature in the vegetation of both hemispheres. This type of vegetation is restricted in the Southern Hemisphere to a very limited area extending from subtropical Argentina and Chile southward and across the Fuegia Peninsula. In striking contrast to the northern deciduous forest the southern one is composed of a single generic type the so-called southern beeches (*Nothofagus antarctica* and its congeners). The west side of Patagonia and Fuegia has an evergreen rain-forest. One of the most abundant elements in that forest is the evergreen species of this same genus, *Nothofagus*. This reminds one in a way of the oaks of North America which are represented by both deciduous and evergreen species. The rain-forest area comprises the westerly slope and summit of the Cordilleras of the Andes. This is a region of perpetual rain and fog. The easterly part of Patagonia and Fuegia presents the other extreme of climate in that it is arid and wind-swept with a comparatively small rainfall. It is the pampas region and supports a distinctly desert vegetation. Lying between these two extremes is the narrow belt of deciduous forest extending over about fifteen degrees of longitude, that is, from southern Fuegia to the Rio

Negro. This corresponds in distance from Central Labrador to Washington, or from Sitka to San Francisco. It seldom exceeds fifty miles in width and is confined to the easterly base of the Andes. Like most other regions lying between two extremes, this transitional region supports a vegetation that is unique and diversified.

Dusén made a special study of the vegetation of Fuegia and reports that few species (not more than four) represent the vegetation of the forest floor in the transitional region in Fuegia. Other travelers speak of the absence or scarcity of vegetation in the beech groves of Patagonia. Whether this is due to the intense shade of the beeches or to historical reasons or to both can only be conjectured. There seems to have been no type of vegetation in this southern region corresponding to the rich spring flora of the forest floor in the north temperate zone.

Lake Argentina is the most southerly of several large lakes in the easterly foothills of the Patagonia Andes. It is a large lake some forty miles long and fifteen miles wide and with long arms at the westerly end, one extending north and the other south for thirty or forty miles. Both of these arms have large glaciers flowing into them. The outlet of the lake is Santa Cruz River which flows eastward into the Atlantic Ocean. The western end of the lake and particularly the north and south arms are filled with icebergs for the greater part of the year. The northern shore rises abruptly into an elevated table land which has been explored only to a very limited extent and that principally along the Leona river which comes down from Lake Veidma some twenty-five miles away and empties into Santa Cruz River near Lake Argentina. The southern shore of the lake is more hospitable and a few sheep ranchers inhabit the region. Between Lake Argentina and its southwesterly arm the region is known as the Burmeister peninsula. There are two mountains on this peninsula, the westerly one Mt. Buenos Aires and the easterly one Mt. Frias. It was from this peninsula and the slopes of these mountains that the principal part of Mr. Furlong's collections were made. South of the Burmeister Peninsula there is a range of mountains, the Baguales, of considerable elevation which extends easterly into the Patagonia high pampas region. These mountains are rough,

covered with volcanic rock and present a formidable barrier to travel to the south. The lake Argentine valley is therefore a vast amphitheater in the east side of the main Cordilleras and apparently affords more favorable conditions for vegetation than any place south or immediately north of it.

The collections from which the descriptions of Patagonia plants have been made are very widely separated. Collections in herbaria in the United States are meager and often imperfectly named. The national herbaria of Chile and of Argentina contain a large amount of the material. The other principal collections are in the Kew Herbarium at London and the National Herbarium at Stockholm, Sweden. This makes it difficult to identify species with absolute certainty. The only works dealing with the flora in a synoptical way are Hooker's Flora Antarctica, Macloskie's Flora of Patagonia, and Reiche's Flora of Chile. Many monographs and lists, however, have appeared.

One of the most recent is a list of plants based on a collection of plants made by Pritchard and published by Rendle in the Journal of Botany in 1904. This collection was also made principally on the Burmeister Peninsula. Rendle's list contains about 150 species of flowering plants, 18 of which are described as new species. Our list contains 166 species of flowering plants. We have refrained from describing as new any of our plants at the present time, but have instead associated each specimen with a name already published. Further study and particularly opportunity to compare our specimens with authentic specimens may warrant recognition of novelties in the collection.

LIST OF SPECIES COLLECTED

LICHENS

1. CLADONIA COCCIFERA (L.) Willd.
2. STICTA ENDOCHRYSEA Delise.
3. NEPHROMA ANTARCTICUM (Wulf.) Nyl.
   Very closely related to *N. arcticum* (L.) E. Fr.

MOSSES

(Determined by A. LeR. Andrews)

4. BARTRAMIA POMIFORMIS (L.) Hedw. var. CRISPA B. & S.

5. WEYMOUTHIA MOLLIS (Hedw.) Broth.
6. POLYTRICHADELPHUS MAGELLANICUS (L.) Mitt.

LYCOPODIACEAE

7. LYCOPODIUM MAGELLANICUM Sw. Syn. Fil. 13. 1806.

POLYPODIACEAE

8. ASPIDIUM MOHRIOIDES Bory, Mém. Soc. Linn. Paris 4: 597. 1826.
9. CYSTOPTERIS FRAGILIS (L.) Bernh. Schrad. Neues Jour. Bot. 1[2]: 27. *pl. 2, f. 9.* 1806.
10. ASPLENIUM MAGELLANICUM Kaulf. Enum. Fil. 175. 1824.

OPHIOGLOSSACEAE

11. BOTRYCHIUM LUNARIA (L.) Sw. Schrad. Jour. Bot. 1800[2]: 110. 1801.

GRAMINEAE

12. DESCHAMPSIA FLEXUOSA (L.) Trin. Bull. Acad. Sc'. St. Petersburg 1: 66. 1836.
    Aira flexuosa L. Sp. Plant. 96. 1753.
13. CORTADERIA PILOSA (D'Urv.) Hack.; Dusén, Svenska Exped. till Magell. 3: 222. 1900.
    Arundo pilosa D'Urv. Mém. Soc. Linn. Paris 4: 600. 1826.

The best known of this genus is Pampas Grass, *C. argentea* (Nees) Stapf. Our species is the only one in the Magellan region. The genus is confined to South America.

14. BROMUS COLORATUS Steud. Syn. Pl. Gram. 429. 1855.
15. POA FUEGIANUS (Hook. f.) Hack.; Dusén, Svenska Exped. till Magell. 3 : 225. 1900. Macloskie, Rep. Princeton Univ. Exp. Pat. 8: 235. *f. 42.* 1905.
    Festuca fuegianus Hook. f. Fl. Ant. 2: 380. *pl. 141.* 1847.

This is the "forma *vivipara*" depicted in Hooker's illustration.

16. FESTUCA GRACILLIMA Hook. f. Fl. Ant. 2: 383. 1847.

The specimens have no flowers and their determination is uncertain. Mr. Furlong says: "Grass from the pampas of Patagonia, vicinity of foot-hills of the Andes between the source of

the Gallegos and Santa Cruz Rivers. It is upon this grass that the great herds of Patagonian sheep feed."

17. FESTUCA PURPURASCENS Banks & Sol.; Hooker, Fl. Ant. **2**: 383. *pl. 140.* 1847.

18. POA PRITCHARDI Rendle, Jour. Bot. **42**: 324. 1904.

From Mt. Buenos Aires, the locality where the type was collected.

19. POA ARGENTINA Speg. Rev. Agron. i Vet. La Plata 1897: 584.

The type was collected at Lake Argentine. It belongs to the sect. *Dioicopoa* of Hackel (Engler & Prantl, Nat. Pflanzenfam. 2^2: 73. 1888). Only the staminate plant appears in this collection.

20. POLYPOGON INTERRUPTUS H. B. K. Nov. Gen. & Sp. 1: 109. *pl. 44.* 1815.

Awns longer and spike more compact than is represented in the original figures.

21. STIPA POGONATHERA Desv.; C. Gay, Fl. Chil. **6**: 277. 1853.

CYPERACEAE

22. CAREX BANKSII Boott, Trans. Linn. Soc. **20**: 119. 1846.

23. CAREX INCONSPICUA Steud. Syn. Pl. Cyp. 221. 1855.

Culms 25 cm. high.

JUNCACEAE

24. LUZULA CHILENSIS Nees & Meyen; Kunth, Enum. Pl. **3**: 312. 1841.

LILIACEAE

25. LUZURIAGA MARGINATA (Banks & Sol.) Benth. & Hook. Gen. Pl. **3**: 768. 1883.

Enargea marginata Banks & Sol.; Gaertner, De Fruct. **1**: 283. *pl. 59. f. 3.* 1788.

AMARYLLIDACEAE

26. ALSTROEMERIA NANA Rendle, Jour. Bot. **42**: 325. 1904.

IRIDACEAE

27. SISYRINCHIUM CHILENSE Hook. Curt. Bot. Mag. *pl. 2786.* 1827.

28. S. JUNCEUM E. Meyer; Presl, Rel. Haenk. 1: 118. 1830.

29. S. STRIATUM Sm. Icon. Pict. *pl. 9.* 1789.

30. S. IRIDIFOLIUM H. B. K. Nov. Gen. & Sp. 1: 324. 1815.

31. SOLENOMELUS SISYRINCHIUM (Griseb.) Pax; Engler & Prantl, Nat. Pflanzenfam. 2^5: 152. 1888.

Lechlera Sisyrinchium Griseb.; Lechler, Pl. Chil. Exsic. *2966.* 1853–1855.

Having every appearance of a *Sisyrinchium* except the elongated ovary.

32. SYMPHYOSTEMON BIFLORUS (Thunb.) Dusén, Svenska Exped. till Magell. 3: 203. 1900.

Gladiolus biflorus Thunb. Diss. Glad. 10. 1784.

33. S. LYCKHOLMI Dusén, Svenska Exped. till Magell. 3: 204. *pl. 10, f. 4–7.* 1900.

BURMANNIACEAE

34. ARACHNITES UNIFLORA Phil. Bot. Zeit. 28: 217. 1864.

This is the only plant of this family growing outside tropical or subtropical regions except the species of *Thismia* discovered recently by Pfeiffer* near Chicago. Our plant, furthermore, is the only vascular saprophyte in south temperate South America. It was first found by Philippi in the Province of Valdivia, Chile, in 1864. In transmitting it to Professor Schlechtendahl, Dr. Phillippi made the following observation: "*Arachnites uniflora* Ph. A new orchid genus from Valdivia. A few weeks ago, in my property in S. Juan, my son discovered a wonderful (to me at least) orchid, a few hundred paces from the dwelling, and under the shade of a macqui-bush (*Aristotelia Macqui*). Unfortunately the large number of specimens which had been collected were destroyed in the fire which on November second laid my possessions in ashes in a half-hour. Only through a lucky accident a few escaped, and these have not been well enough preserved to allow me to make out distinctly the structure of the gynostemium,

* Bot. Gaz. 57: 122. 1914.

which, at all events, is very anomalous." The next year he sent to the editor of Verh. d. zoologisch-botanischen Gesellschaft the following letter:

"S. JUAN IN THE PROVINCE OF VALDIVIA,
"February 5th, 1865.

"Dear Sir:

"About a year ago I received from Professor von Schlechtendal a report on a remarkable orchid (?) which my eldest son had discovered here in several places on the same unlucky day in which the whole of my possessions were burned. I called this plant *Arachnites uniflora*. I had not been able to recognize with certainty the pistil and stamens in the small, dried specimens which I possessed. However, there appeared to me to be present six stamens of the usual form. In the latter part of November, my son, in spite of the great amount of labor that the management and rebuilding of the estate involved, again found this plant and studied and portrayed it. I herewith share with you his drawings and descriptions so that you may convince yourself that this plant must unquestionably found a distinct family.

"*Arachnites* occurs not infrequently in the neighborhood of my house, always in the shade of *Aristotelia Macqui* and other trees, which usually will not suffer other vegetation beneath them. It appears to be a wound (?) parasite. In height it varies from between a foot and a foot and a half. All specimens, without exception, are one-flowered."

It has been found in several places along the Andes south from Valdivia to somewhat south of Lake Argentine. It grows in peaty humus in the shade of various trees.

ORCHIDACEAE

35. CHLORAEA KINGII (Hook. f.) Wildeman, Rés. Voy. Belgica, Bot. Phan. 72. 1905.

Asarca Kingii Hook. f. Fl. Ant. **2**: 351. 1847.

36. C. PLEISTODACTYLA Kraenzl. & Speg. Anal. Mus. Nac. Buenos Aires **7**: 167. 1902.

This species is closely related to, if not identical with, *Asarca arauacana* Phil. Linnaea **29**: 56. 1857–1858.

37. C. MAGELLANICA Hook. f. Fl. Ant. **2**: 350. 1847.

A beautiful and striking plant on account of dark veins of the bracts and the perianth.

38. CODONORCHIS LESSONII (D'Urv.) Lindl. Gen. & Sp. Orch. 411. 1830–1840.

Pogonia tetraphylla Poepp. & Endl. Nov. Gen. & Sp. Pl. **2**: 16. *pl. 122*. 1838.

FAGACEAE

39. NOTHOFAGUS ANTARCTICA (Forst.) Oerst. Videnskab. Selsk. Skr. V. **9**: 354. 1873.
Fagus antarctica Forst. Comm. Soc. Gotting. **9**: 24. 1789.
Young leaves just developing from the scaly buds.

URTICACEAE

40. URTICA MAGELLANICA Juss.; Poiret, Encycl. Meth. Suppl. **4**: 223. 1815.

PROTEACEAE

41. EMBOTHRIUM COCCINEUM Forst. Char. Gen. Plant. 16. *pl. 8.* 1776.

MYZODENDRACEAE

42. MYZODENDRON QUADRIFLORUM DC. Coll. Mém. **6**: *pl. 12, f. 2*, 1830; Skottsberg, Engler, Pflanzenreich 4^{58}: 12. 1914.
43. M. LINEARIFOLIUM DC. Prodr. **4**: 671. 1830; Skottsberg, *l. c.* 11.
44. M. PUNCTULATUM Banks; Solander in Forster, Comm. Soc. Gotting. **9**: 45. 1789 (*nomen nudum*); De Candolle, Prodr. **4**: 286. 1830; Skottsberg, *l. c.* 15.

SANTALACEAE

45. ARJONA PUSILLA Hook. f. Fl. Ant. **2**: 342. 1847.
46. A. TUBEROSA Cav. Icon. Pl. **4**: 57. *pl. 383.* 1797.
47. MYOSCHILOS OBLONGUM Ruiz & Pavon, Syst. Veg. 73. 1798; Fl. Peruv. & Chilen. **3**: 20. *pl. 242.* 1802.
48. QUINCHAMALIUM PROCUMBENS Ruiz & Pavon, Fl. Peruv. & Chilen. **2**: 1. *pl. 107b.* 1799.

CHENOPODIACEAE

49. CHENOPODIUM ALBUM L. Sp. Plant. 219. 1753.
50. C. ANTARCTICUM (Hook. f.) Benth. & Hook. f. Gen. Pl. **3**: 52. 1880.
Blitum antarcticum Hook. f. Fl. Ant. **2**: 549. 1847.

CARYOPHYLLACEAE

51. CERASTIUM ARVENSE L. Sp. Pl. 438. 1753.
52. MELANDRIUM MAGELLANICUM (Lam.) Fenzl; Rohrbach, Linnaea **36**: 224. 1869–70.

Lychnis magellanica Lam. Encycl. Méth. **3**: 641. 1784.

53. M. ALPESTRE Dusén, Ark. f. Bot. **7**[2]: 15. 1907.
54. STELLARIA DEBILIS Urv. Mém. Soc. Linn. Paris **4**: 618. 1826.
55. ARENARIA SERPYLLOIDES C. Gay var. ANDICOLA (Gill.), Reiche, Fl. Chil. **1**: 192. 1896.
    Arenaria andicola Gill.; Hook. Bot. Misc. **3**: 148. 1833.

RANUNCULACEAE

56. ANEMONE MULTIFIDA Poir. var. GRANDIFLORA Rendle, Jour. Bot. **62**: 328. 1904.
57. RANUNCULUS PEDUNCULARIS Sm. var. PATAGONICUS Poepp. Frag. Syn. Phaner. 20. 1833.
58. R. CYMBALARIA Pursh, Fl. Am. Sept. 392. 1814.

BERBERIDACEAE

59. BERBERIS EMPETRIFOLIA Lam. Tab. Encyc. Bot. Illustr. Gen. **2**: 391. 1793.
60. B. ILICIFOLIA Linn. f. Suppl. Plant. 210. 1781.
61. B. MICROPHYLLA Forst. Comm. Soc. Gotting. **9**: 29. 1789.

CRUCIFERAE

62. CARDAMINE HIRSUTA L. var. MAGELLANICA Phil. Anal. Univ. Chil. 666. 1872.
63. THLASPI MAGELLANICUM Pers. Syn. Plant. **2**: 189. 1805.
64. CORONOPUS AUSTRALIS (Hook. f.) Macloskie, Rep. Princeton Univ. Exp. Pat. **8**: 428. 1905.
    Senebiera australis Hook. f. Fl. Ant. **2**: 241. 1847.

MAGNOLIACEAE

65. DRIMYS WINTERI Forst. Char. Gen. Plant. 84. *pl. 42*. 1776.

SAXIFRAGACEAE

66. ESCALLONIA RUBRA Pers. Syn. Plant. **2**: 235. 1805.

This is called by the English colonists the "Elserly Bush." The presence of resin dots on the lower surface of the leaves distinguishes it from the next species.

67. E. BRITTENIANA Rendle, Jour. Bot. **42**: 330. 1904.

68. RIBES CUCULLATUM Hook. & Arn.; Hooker, Bot. Misc. **3**: 340. 1833.
69. SAXIFRAGA CORDILLERARUM Presl, Rel. Haenk **2**: 55. 1835–36.
70. S. CORDILLERARUM Presl var. BREVISCAPA (Hook. f.) Macloskie, Rep. Princeton Univ. Exp. Pat. **8**: 459. 1905.
S. exarata Vill. var. *breviscapa* Hook. f. Fl. Ant. **2**: 280. 1847.

ROSACEAE

71. ACAENA MAGELLANICA Vahl var. VENULOSA (Griseb.) Bitter, Biblist. Bot. **74**: 168. 1911.
A. venulosa Griseb. Goett. Abh. **6**: 118. 1854.
72. A. PLATYACANTHA Speg. Rev. Agron. i Vet. La Plata 1897: 515.
73. A. PHILIPPI Dusén, Svenska Exp. till Magell. **3**: 167. 1900.
A. sericea Phil. Anal. Univ. Chil. **84**: 621. 1893. Not *A. sericea* Jacq.
74. A. MULTIFIDA Hook. f. Fl. Ant. 265. 1844.
75. GEUM MAGELLANICUM Comm.; Persoon, Syn. Plant. **2**: 57. 1807.
76. POTENTILLA ANSERINA L. Sp. Plant. 495. 1753.

LEGUMINOSAE

77. ADESMIA BORONOIDES Hook. f. Fl. Ant. 257. 1844.
78. A. SALICORNIOIDES Speg. Anal. Soc. Cien. **53**: 31. 1901.
79. **A. glandulifera** (Rendle) comb. nov.
Patagonium glanduliferum Rendle, Jour. Bot. **42**: 332. 1904.
80. **A. campestris** (Rendle) comb. nov.
Patagonium campestre Rendle, Jour. Bot. **42**: 332. *pl. 465*. 1904.
81. A. PARVIFOLIA Phil. Linnaea **28**: 683. 1856.
82. A. PUMILA Hook. f. Fl. Ant. 255. 1844.
83. A. VILLOSA Hook. f. Fl. Ant. 256. 1844.
84. ANARTHROPHYLLUM PRITCHARDI Rendle, Jour. Bot. **42**: 331. 1904.
85. **Astragalus Dusenii** nom. nov.
A. brevicaulis Dusén, Svenska Exped. till. Magell. **3**: 158. 1900. Not *A. brevicaulis* A. Nelson, Bull. Torrey Club **26**: 9. 1899.

86. A. PATAGONICUS (Phil.) Dusén, Svenska Exped. till Magell. **3**: 256. 1900.
Phaca patagonica Phil. Anal. Univ. Chil. **84**; 20. 1893.
87. LATHYRUS MAGELLANICUS Lam. Encycl. Méth. **2**: 708. 1806.
88. VICIA SERICELLA Speg. Anal. Soc. ci Argent. **47**: 278. 1899.
89. V. MAGELLANICA Hook. f. Fl. Ant. **2**: 257. 1847.
90. ERODIUM CICUTARIUM L'Hérit.; Aiton, Hort. Kew., ed. 1, **2**: 414. 1789.
91. GERANIUM SESSILIFLORUM Cav. Icon. Plant. **4**: 198. *pl. 77, f. 2.* 1797.

Standley (Contr. U. S. Nat. Herb. **18**: 111. 1916) has described a closely related species, *G. confertum*, collected by Pittier from the Central Cordillera of Colombia at altitudes of 3,000 to 3,600 meters.

92. G. MAGELLANICUM Hook. f. Fl. Ant. 251. 1844.

OXALIDACEAE

93. OXALIS PATAGONICA Speg. Rev. Agron. i Vet. La Plata 1897: 501.

EUPHORBIACEAE

94. EUPHORBIA PORTULACOIDES L. Sp. Plant. 456. 1753.

CELASTRACEAE

95. MAYTENUS MAGELLANICUS (Lam.) Hook. f. Fl. Ant. 254. *pl. 130.* 1844.
CASSINE MAGELLANICA Lam. Encycl. Méth. **10**: 130. 1811.

RHAMNACEAE

96. DISCARIA DISCOLOR (Hook. f.) Reiche, Fl. Chil. 16. 1898.
Colletia discolor Hook. f. Icon. Plant. *pl. 538.* 1838.

VIOLACEAE

97. VIOLA MACULATA Cav. Icon. Plant. **6**: 20. *pl. 539.* 1793.
"Throughout islands of Terra del Fuego. Vega regions." *C. W. F.*

LOASACEAE

98. LOASA VOLUBILIS Juss. Ann. Mus. Paris **5**: 26. *pl. 5, f. 1.* 1804.

99. L. ARGENTINA Urb. & Gilg, Nov. Act. Nat. Cur. **76**: 186. 1900.

ONAGRACEAE

100. EPILOBIUM PATAGONICUM Rendle, Jour. Bot. **42**: 367. 1904.

101. FUCHSIA MAGELLANICA Lam. Encycl. Méth. **2**: 564. 1783.

102. OENOTHERA ODORATA Jacq. Icon. Plant. Rar. **3**: 3. *pl. 456.* 1786–93.

103. PSEUDOPANAX LAETEVIRENS (C. Gay) Franchet, Miss. Sci. Cap. Horn 339. *pl. 1.* 1889.
Aralia laetevirens C. Gay, Fl. Chil. **3**: 151. 1847.

UMBELLIFERAE

104. AZORELLA TRIFURCATA (Gaertn.) Pers. Syn. **1**: 303. Hook. f. Icon. Plant. **6**: *pl. 539.* 1843.
Chamitis trifurcata Gaertn. De Fruct. **1**: 95. *pl. 22. f. 4.* 1788.

105. A. TRIFOLOLIATA Clos; C. Gay, Fl. Chil. **3**: 85. *pl. 30, f. 2.* 1847.
Leaflets less distinctly lobed than indicated in Gay's illustration.

106. CONIUM MACULATUM L. Sp. Plant. 243. 1753.

107. MULINUM SPINOSUM Pers. Syn. Plant. **1**: 309. 1805.

108. OREOMYRRHIS ANDICOLA Endl. Gen. Pl. 787. 1839.

109. OSMORHIZA BERTERII DC. Prodr. **4**: 232. 1830.

110. PERNETTYA MUCRONATA (Linn. f.) Gaud. Ann. Sci. Nat. Bot. I. **5**: 102. 1825.
Arbutus mucronata Linn. f. Suppl. Plant. 239. 1781.

PRIMULACEAE

111. SAMOLUS SPATHULATUS (Cav.) Duby; DeCandolle, Prodr. **8**: 74. 1844.
Androsace spathulata Cav. Icon. Plant. **5**: 56. *pl. 484. f. 1.* 1799.

PLUMBAGINACEAE

112. ARMERIA CHILENSIS Boiss. var. MAGELLANICA Boiss.; De Candolle, Prodr. **12**: 682. 1848.

GENTIANACEAE

113. GENTIANA PATAGONICA Griseb. Gen. Spec. Gent. 237. 1839.

POLEMONIACEAE

114. COLLOMIA COCCINEA Lehm.; Bentham, Bot. Reg. *pl. 1622.* 1833.

Phlox linearis Cav. Icon. Plant. **6**: 17. *pl. 527.* 1801.

115. C. GRACILIS Dougl.; Hooker, Bot. Mag. *pl. 2924.* 1829 (as synonym); Bentham, Bot. Reg. *pl. 1622.* 1833.

Gilia gracilis Hook. Bot. Mag. *pl. 2924.* 1829.

HYDROPHYLLACEAE

116. PHACELIA CIRCINATA Jacq. f. Eclog. Am. Plant. **1**: 135. *pl. 1.* 1811–16.

SCROPHULARIACEAE

117. CALCEOLARIA BIFLORA Lam. Encycl. Méth. **1**: 556. 1783.

C. plantaginea Smith, Plant. Icon. **1**: 2. *pl. 2.* 1789.

118. C. TENELLA Poepp. & Endl. Nov. Gen. Sp. Plant. **3**: 76. *pl. 287.* 1845.

A delicate species. Leaves nearly orbicular, about 5 mm. in diameter, the flower about 1 cm. in length and breadth.

119. C. UNIFLORA Lam. Tab. Encycl. Méth. **1**: 52. 1791.

120. **C. Pritchardi** (Rendle) comb. nov.

Fagelia Prichardi Rendle, Jour. Bot. **42**: 371. 1904.

121. EUPHRASIA ANTARCTICA Benth.; DeCandolle, Prodr. **10**: 555. 1846.

122. OURISIA RUELLOIDES (Linn. f.) Gaertn. f. De Fruct. **3**: *pl. 185.* 1805–07.

Chelone ruelloides Linn. f. Suppl. Plant. 271. 1781.

Ourisia magellanica Gaertn. f. De Fruct. **3**: 44. *pl. 185.* 1805–07.

BORAGINACEAE

123. AMSINCKIA ANGUSTIFOLIA Lehm. Del. Sem. Hort. Hamb. 7. 1831.

124. ERITRICHIUM DIFFUSUM Phil. Plant. Chil. 191. 1894.

VERBENACEAE

125. VERBENA PRITCHARDI Rendle, Jour. Bot. **43**: 33. 1905.
126. V. CARROO Speg. Anal. Soc. Cient. Argent. **15**: 112. 1883.
127. SATUREIA DARWINII (Benth.) Briquet; Engler & Prantl, Nat. Pflanzenfam. 4^{3a}: 300. 1897.
Micromeria Darwinii Benth.; DeCandolle, Prodr. **12**: 222. 1848.

PLANTAGINACEAE

128. PLANTAGO MARITIMA L. Sp. Plant. 114. 1753.

RUBIACEAE

129. CRUCKSHANKSIA GLACIALIS Poepp. & Endl. Nov. Gen. Sp. Plant. **3**: 31. *pl. 236.* 1845.
Oreopolus citrinus Schlecht. Linnaea **28**: 493. 1856.
130. RELBUNIUM PUSILLIUM (Gill.) K. Schum.; Martius, Fl. Bras. 6^{6}: 117. 1888.
Rubia pusilla Gill.; Hooker & Arnott, Bot. Misc. **3**: 363. 1833.
131. GALIUM APARINE L. Sp. Plant. 108. 1753.

VALERIANACEAE

132. VALERIANA CARNOSA Smith, Pl. Icon. Ined. **3**: *pl. 52.* 1791.
133. V. LAPATHIFOLIA Vahl, Enum. Plant. **2**: 11. 1806.

CALYCERACEAE

134. MOSCHOPSIS SPATHULATA Dusén, Ark. f. Bot. 7^{2}: 41. *pl. 5, f. 7; pl. 8, f. 13, 15.* 1908.

The specimens were collected near Cerro Sepulchro on a divide in the Baguales Mountains, at an altitude of 1,800 meters. They do not agree in all respects with the incomplete descriptions and figures given by Dusén but are more like that species than any other we have found described.

COMPOSITAE

135. BACCHARIS DARWINII Hook. & Arn. Jour. Bot. **3**: 34. 1841.
136. B. PATAGONICA Hook. & Arn. *l. c.* **3**: 29. 1841.
137. B. MAGELLANICA (Lam.) Pers. Syn. Plant. **2**: 425. 1807.
Conyza magellanica Lam. Encycl. Méth. **2**: 91. 1806.

138. CHILIOTRICHIUM DIFFUSUM (Forst.) Dusén Svenska Exped. till Magell. **3**: 99. 1900.
Amellus diffusus Forst. Comm. Soc. Gotting. **9**: 39. 1789.

139. CULCITIUM MAGELLANICUM (Hook. & Arn.) Hombr. & Jacquem.; Decaisne, Bot. Voy. Astrol. et Zél. 45. 1853.
Senecio magellanicus Hook. & Arn. Jour. Bot. **3**: 343. 1841.

140. ERIGERON ALPINUS L. Sp. Plant. 864. 1753.

There is a great variation in size in the specimens. The largest are 25 cm. high. The smallest are nearly acaulescent and about 4 cm. high.

141. E. SPICULOSUS Hook. & Arn. Bot. Beech. Voy. **1**: 32. 1841.

142. HIERACIUM TRISTE Willd.; Sprengel in Linnaeus, Syst. Veg. ed. 16, **3**: 640. 1826.

143. H. AUSTRO-AMERICANUM Dahlst.; Dusén, Ark. f. Bot. 7^2: 51. 1907.

144. HYPOCHOERIS ARENARIA Gaud. Ann. Sci. Nat. Bot. I. **5**: 103. 1825.

145. ANTENNARIA MAGELLANICA Sch. Bip. Flora **38**: 117. 1855.

146. A. CHILENSIS Remy; C. Gay, Fl. Chil. **4**: 235. 1849.

147. GNAPHALIUM PURPUREUM L. Sp. Plant. 854. 1753.

148. G. SPICATUM Lam. Encycl. Méth. **2**: 757. 1806.

149. LAGENOPHORA HIRSUTA Poepp.; Lessing, Linnaea **6**: 131. 1831.

150. LEUCERIA LANIGERA O. Hoffm.; Dusén, Svenska Exped. till Magell. **3**: 115. 1900.

151. L. PATAGONICA Speg. Rev. Agron. i Vet. La Plata 1897: 538.

152. L. MULTIFIDA (DC.) S. Moore; Rendle, Jour. Bot. **42**: 376. 1904.
Chabraea multifida DC. Prodr. **7**: 60. 1838.

153. L. PURPUREA (Vahl) O. Hoffm.; Dusén, Svenska Exp. till Magell. **3**: 118. 1900.
Chabraea purpurea DC. Ann. Mus. Paris **19**: 65, 71. *pl. 19.* 1812.

154. L. RUNCINATA Gill. & D. Don, Phil. Mag. 1832: 389.
Chabraea rosea DC.; Delessert, Icon. Sel. Plant. **4**. *pl. 90.* 1820.

155. MADIA SATIVA Molina, Sagg. Chile 136. 1782.
The specimens vary from 40 cm. to only 4 cm. high.
156. NARDOPHYLLUM HUMILE (Hook. f.) A. Gray, Proc. Amer. Acad. **5**: 123. 1862.
Chiliotrichium humile Hook. f. Fl. Ant. 304. 1844.
157. NASSAUVIA DARWINII (Hook. & Arn.) O. Hoffm.; Dusén, Svenska Exped. till Magell. **3**: 112. 1900.
Panargyrus Darwinii Hook. & Arn. Comp. Bot. Mag. **2**: 43. 1836.
158. N. PYGMAEA Hook. f. F. Ant. **2**: 319. 1847.
159. N. REVOLUTA D. Don, Phil. Mag. **11**: 390. 1832.
160. N. SUBSPINOSA (Phil.) Wildeman, Rés. Voy. Belgica, Bot. Phan. 177. 1905.
Panargyrum subspinosum Phil. Anal. Univ. Chil. **85**: 98. 1894.
161. PEREZIA RECURVATA (Vahl) Lag. Amen. Nat. Esp. 31. 1811.
162. P. LINEARIS Less. Syn. Gen. Comp. 412. 1832.
163. SENECIO ACANTHIFOLIUS Hombr. & Jacquem.; Decaisne, Voy. Astrol. et Zél. 46. *pl. 115*. 1853.
164. S. HATCHERIANUS Hoffm.; Macloskie, Rep. Princeton Univ. Exp. Pat. **8**: 847. 1905.
165. S. PATAGONICUS Hook. & Arn. Jour. Bot. **3**: 344. 1841.
166. S. DARWINII Hook. & Arn. *l. c.* **3**: 333. 1841.
167. S. FALKLANDICUS Hook. f. Fl. Ant. 316. *pl. 110*. 1844.
168. S. KINGII Hook. f. *l. c.* 314. 1844.
169. S. LONGIPES Hook. f. *l. c.* 314. 1844.
170. S. PAENINSULARIS S. Moore; Rendle, Jour. Bot. **42**: 374. 1904.
171. S. SERICEO-NITENS Speg. Rev. Agron. i Vet. La Plata 1897: 537.
172. S. TRIFURCATUS Less. Syn. Comp. 392. 1832.
173. TARAXACUM LAEVIGATUM DC. Cat. Hort. Monsp. 149. 1813.
174. ACHYROPHORUS TENUIFOLIUS DC. Prodr. **7**: 94. 1838.
175. ASTER VAHLII Hook. & Arn. Comp. Bot. Mag. **2**: 49. 1836.
176. MATRICARIA CHAMOMILLA L. Sp. Plant. 891. 1753.
177. ADENOCAULON CHILENSE Less. Linnaea **6**: 107. 1831.

CORNELL UNIVERSITY

Peruvian mosses

R. S. Williams

(with plates 17–20)

The following list is made up of two collections. The first, obtained by Harry Ward Foote, on the Yale Peruvian Expedition of 1911, was kindly forwarded by Dr. A. W. Evans of Yale. It consisted of forty-eight packets and contained thirty-seven species among which appear to be two novelties, also two species known before only from Patagonia. The specimens are from localities varying from about 900 to 3,300 meters in altitude. They were without number, and I have accordingly rearranged and numbered them from 1 to 48.

The second collection consisted of forty-three packets, obtained by Messrs. Cook and Gilbert, with the exception of three species by Hiram Bingham, while on the Yale University-National Geographic Society Peruvian Expedition in 1915. In this second collection four species are apparently new to science. I may say that it was through the coöperation of the United States Department of Agriculture that Messrs. Cook and Gilbert were detailed to accompany this expedition and the specimens were forwarded to me by Mr. William R. Maxon of the United States National Museum. The altitude at which this second collection was obtained varies from 1,800 to 4,100 meters, and there are thirty-three species not in the first collection, making seventy species in this list. The type specimens of the new species are deposited in the herbarium of the New York Botanical Garden.

Dicranum Mittenii C. Müll.

Above Arma Valley, July, 1915, *H. Bingham 2063*.

I have not been able to find any publication of this species except that by Brotherus in Engler & Prantl's Nat. Pflanzenfam. (1: 328), under subgenus 4. It is a plant of medium size with the ovate leaf-base quickly narrowed to a long, subulate and serrulate point; the alar cells are numerous, those above in the

broader part of the leaf narrow and elongate with pitted walls. The collection is scanty and sterile.

CAMPYLOPUS LEUCOGNODES (C. Müll.) Paris.

Lucumayo Valley, 3,600 m., June, 1915, *Cook & Gilbert 1264a.*

FISSIDENS ASPLENIOIDES (Sw.) Hedw.

San Miguel, on rock, 1,820 m., September, 1911, *Foote 1.*

FISSIDENS CRISPUS Mont.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 754.*

FISSIDENS RIGIDULUS Hook. f. & Wils.

Ollantaytambo, on rock, about 3,000 m., May, 1915, *Cook & Gilbert 670.*

TRICHOSTOMUM BRACHYDONTIUM Bruch.

Cuzco, on dry rock, about 3,500 m., July, 1911, *Foote 2;* these Cuzco specimens have leaves shorter and broader than in typical specimens and possibly should not be referred here, but they seem to be only a stunted form of the species; Lucma, on dead wood, 2130 m., August, 1911, *Foote 15a.*

TRICHOSTOMUM SEMIVAGINATUM Schimp.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 501a.*

Leptodontium integrifolium sp. nov.

Dioecious, the male plants about like the fertile, the flowers with outer leaves similar to those of the stem, the inner broadly oblong, rounded obtuse, scarcely one third the length of the outer, costate, of mostly golden-brown, elongate, smooth cells enclosing five or six antheridia and numerous, longer, filiform paraphyses: fertile plants simple or slightly branched, the stems 3–4 cm. long with scattered, loose tufts of radicles and leaves, when dry rather loosely imbricate and incurved-flexuous, when moist spreading-recurved; stem-leaves 3–3.5 mm. long, ovate-lanceolate, the entire margins strongly recurved from a little below the apex to near the base and papillose; costa stout, papillose on the back, excurrent into a serrulate point sometimes 0.5 mm. long; cells of the upper part of leaf rather obscure, scarcely elongate, 8–9 μ in diameter, densely papillose on both sides, in the lower fourth of leaf, elongate, narrowly rectangular, smooth, except near the margin and costa; perichaetial leaves about 6 mm. long, convolute, with a subulate, abruptly spreading, serrulate point; fruit unknown. (PLATE 17, FIGS. 1–7.)

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 704a*.

Growing with *Thuidium peruvianum*.

Globulina peruviana sp. nov.

Inflorescence unknown: plants in rather compact mats with simple stems 1–4 mm. high, bearing radicles at the base and imbricate-appressed leaves rather uniformly placed along the stem or somewhat clustered at the apex and forming a globose bud about 0.5 mm. in diameter; stem in cross-section about 200 μ in diameter with cells of outer walls not differentiated and with a distinct central strand; leaves rotundate or slightly oblong, about 0.5 mm. long, more or less cucullate, the flat margins crenulate half way down or more; costa vanishing abruptly a little below the apex, rather weak in the lower part, widest near the apex, slightly rough on the back and papillose on the inner face, in cross-section showing two rows of medium-sized, thick-walled cells on the dorsal side and a single row of much larger cells on the ventral side; cells mostly gradually smaller from the base to the apex of the leaf, more or less shortly rectangular below, 12–16 μ by 16–30 μ, toward the apex square to rhomboidal, with sides 6–8 μ long, finely papillose on both sides about the upper half of the costa, the marginal cells smooth; fruit unknown. (PLATE 17, FIGS. 8–15.)

Araranca, south side of Roya Pass, about 4,100 m., April, 1915, *Cook & Gilbert 177a*.

Growing apparently on dry soil with *Pogonatum polycarpum*, at the highest elevation given for any of the collections.

BARBULA COSTATA Mitt.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 610b*.

A small amount of what is apparently this species occurred, with immature fruit, growing with *Bryum argenteum*. What appears to be this also was found sterile, mixed with *Leskea gracillima*, at the same locality by these collectors, *663a*.

BARBULA PRUINOSA (Mitt.) Jacq.

Cuzco, on dry rock, 3,500 m., July, 1911, *Foote 3*.

BARBULA REPLICATA Tayl.

Cuzco, on dry rock, 3,500 m., July, 1911, *Foote 4;* Ollantaytambo, about 3,000 m., on soil, May, 1915, *Cook & Gilbert 610a*.

Mitten was correct, I believe, in thinking *B. apiculata* Hampe not distinct from this species.

BARBULA SUBULATULA C. Müll.

Urubamba, on damp earth, 2,900 m., July, 1911, *Foote 5*.

TORTULA AFFINIS Hampe.

Sicuani, Vilcanota Valley, on stone, about 3,600 m., April, 1915, *Cook & Gilbert 157;* Ollantaytambo, on rock, about 3,000 m., May, 1915, *Cook & Gilbert 612;* Urubamba, on rock, 2,900 m., July, 1911, *Foote 6*.

Tortula bipedicellata Besch. and *T. confusa* Card., I believe, do not differ from *T. affinis*, which in turn is very close to *T. pichinchensis* (Tayl.) Mitt., differing chiefly in having a low basal membrane of the peristome, the cell structure of which also varies. In *T. pichinchensis* the cells are often as high as broad, and somewhat rhomboidal in slightly oblique rows; in *T. affinis* the cells are low, mostly two or three times broader than high.

TORTULA ANDICOLA Mont.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 771*.

Tortula lacerifolia sp. nov.

Dioecious: plants with stems (in this small collection scattered through cushions of *Fabronia andina*) mostly simple, 6–8 mm. high, with radicles at the base and leaves more or less aggregate toward the apex; stem-leaves twisting incurved when dry, erect-spreading when moist, oblong, mostly 2–2.5 mm. long, the margins usually deeply incised in the upper half into readily separating, narrow, irregular segments, often 0.25 mm. long and twisted part way round or inflexed or reflexed, the margins of the lower leaf being entire and recurved; costa golden-brown, stout, near the base 80 μ wide, smooth on the back, more or less papillose on the upper side, excurrent into a thorn-like spine, in cross-section showing two large guide-cells, a large band of stereid cells on the dorsal side, with two medium-sized cells on the ventral side; cells throughout upper leaf rather obscure, mostly hexagonal, mamillose and covered on both sides with small often C-shaped papillae, those of lower leaf pale, with few or no papillae and mostly short-rectangular, up to about 18 μ wide by 40–50 μ long; outer perichaetial leaves like those of the stem, the inner small, pale, more or less deeply cleft into numerous segments, the archegonia numerous, with few paraphyses; fruit unknown. (PLATE 18, FIGS. 1–6.)

Ollantaytambo, about 3,000 m., July, 1911, *Foote 7*.

GRIMMIA MICRO-OVATA C. Müll.

Temple of Viracocha near Tinta, on rock, about 3,500 m., April, 1915, *Cook & Gilbert 206;* Ollantaytambo, on rock, about 3,000 m., May, 1915, *Cook & Gilbert 609*.

GRIMMIA OVATA Web. & Mohr.

Cuzco, on dry rock, about 3,500 m., 1911, *Foote 8*.

Grimmia rivulariopsis sp. nov.

Dioecious, the male plant rather more slender than the fertile with often 2–3 flowers scattered along the stem; the inner perigonial leaves small, ovate, ecostate, or faintly costate, enclosing rather numerous, fusiform antheridia about 0.5 mm. long, without paraphyses: fruiting-plants abundantly branching, 2–3 cm. high, without radicles and bearing slightly secund leaves, erect-spreading when moist, mostly somewhat incurved-appressed when dry; stem-leaves oblong-ovate, about 2 mm. long, rather abruptly narrowed to an acute, serrulate apex, the margins entire, of a double thickness of cells and recurved from a little below the apex to near the base; costa stout, percurrent, smooth on both sides and flat or convex on the ventral side in the upper part; cells of stem-leaves distinct, smooth, with slightly thickened, scarcely or not sinuous walls, the median mostly 6 μ wide by 6–8 μ long, the basal more or less rectangular, 8 μ wide by 16–22 μ long; perichaetial leaves larger than those of the stem, about 3.5 mm. long, the costa of the inner leaves rather faint below, widest toward the apex, not quite percurrent, the cells of the lower half of leaf narrowly rectangular or linear with slightly thickened, straight walls; capsule ovate, immersed, about 1.5 mm. high, without stomata, a band of five or six rows of small, transversely elongate cells about the rim, the median exothecal cells scarcely or not elongate, rather irregular with scarcely thickened or sinuous walls, up to 25 μ in diameter; seta erect, scarcely one half the capsule in height; peristome-teeth lanceolate, about 120 μ wide at the base and 400 μ high, red, papillose, entire or often split at the apex or along the median line and slightly lacunose; annulus none; lid convex, obliquely apiculate; calyptra little more than covering the apiculus, the base cleft into several lobes. (PLATE 19.)

Ollantaytambo, about 3,000 m., on rock in stream bed, May, 1915, *Cook & Gilbert 753;* and on rock, same place and collectors, *561*.

Most closely related to *G. amblyophylla* C. Müll. of the South American species, but the apex of the leaf is very different, the

cells of the stem-leaves much smaller, with thinner, scarcely sinuous walls and the inner perichaetial leaves have much longer, narrower cells throughout the lower leaf.

RHACOMITRIUM CRISPIPILUM (Tayl.) Jacq.

Lucumayo Valley, 3,000 m., June, 1915, *Cook & Gilbert 1264.*

FUNARIA CALVESCENS Schwaegr.

Ollantaytambo, about 3,000 m., on wet soil, May, *Cook & Gilbert 669;* Manchu Picchu, about 2,100 m., May, *Cook & Gilbert 996.*

MIELICHHOFERIA ANDINA Sull.

Araranca, south side of La Roya Pass, about 4,100 m., on earth wall, April, 1915, *Cook & Gilbert 182a.*

MIELICHHOFERIA BOGOTENSIS Hampe.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 705.*

LEPTOBRYUM WILSONI (Mitt.) Broth.

Arequipa, on wet rock, 2,300 m., June, 1911, *Foote 9.*

ANOMOBRYUM FILIFORME (Dicks.) Husn.

Santa Rosa, on dry hillside, 3,960 m., July, 1911, *Foote 10.*

BRYUM ANDICOLA Hook.

Above San Miguel, on rocks, 1,830 m., September, 1911, *Foote 11.*

BRYUM ARGENTEUM L.

Cuzco, on dry rock, 3,500 m., 1911, *Foote 12;* Ollantaytambo, on soil, about 3,000 m., May, 1915, *Cook & Gilbert 610.*

Bryum biforme sp. nov.

Pseudoautoicous, the male plants minute, 1–2 mm. high, attached by radicles to the tomentum of the fertile stems, each plant bearing one or two flowers containing two or three antheridia, with few, somewhat longer paraphyses; the outer antheridial leaves broadly ovate-lanceolate, scarcely serrulate, with costa vanishing well below the apex: fertile plants with more or less branching, tomentose stems 3–4 cm. high, the short branches often bearing at the apex abundant, filiform flagella, 3–4 mm. long and covered with minute scale-like leaves; stem-leaves widely spreading when moist, somewhat spreading-flexuous and twisted when dry, serrulate above, rather broadly ovate, acute, slightly decurrent, 3–3.5 mm. long, the margins flat above, recurved below with a border of elongate, narrow, pale cells most distinct half

way down the leaf where it becomes four or five cells wide; costa not quite percurrent, from a broad, reddish brown base, tapering gradually to the slender apex; cells in upper leaf rhomboidal or hexagonal, in lower leaf larger and more or less rectangular, all with somewhat thickened walls distinctly pitted, at least in the lower leaf; the median cells about 16 μ wide and 40–50 μ long; outer perichaetial leaves about the length of the stem-leaves, from a broad base, oblong, acute, serrulate and with costa vanishing a little below the apex; seta about 2 cm. long; capsule pendent with sporangium rather narrowly ovate and tapering into a neck about one half the length of the sporangium, the median exothecal cells irregularly elongate with evenly thickened, mostly slightly curving walls, the stomata abundant in the neck, about 40 μ long; annulus large; peristome-teeth lanceolate, about 100 μ wide at the base and 600 μ high, with hyaline borders and the outer plates finely punctate, mostly one and one half to two times wider than high, the inner lamellae without cross-walls; inner segments about the height of the teeth, keeled and solid along the median line, very slender-pointed with mostly two long, slender cilia between them, sometimes distinctly appendiculate; spores rough, up to 20 μ in diameter; lid highly convex-apiculate. (PLATE 20.)

Torontoy, Urubamba Valley, about 3,600 m., May, 1915, *Hiram Bingham 730.*

This is, I believe, the only *Bryum* known having inflorescence as above described; the flagella also are unusual.

BRYUM DENSIFOLIUM Brid.

Urubamba, on damp earth, 2,900 m., July, 1911, *Foote 13;* Santa Anna, 912 m., August, 1911, *Foote 14.*

MNIUM LIGULATUM C. Müll.

Lucma, on dead wood, 2,130 m., Aug. 1911, *Foote 15*, growing mixed with *Cyclodictyon aeruginosum* (Mitt.) Broth. and *Trichostomum brachydontium* Bruch.; Urubamba, on wet earth, 2,900 m., July, 1911, *Foote 16.*

ANACOLIA SUBSESSILIS (Tayl.) Broth.

Urubamba, on loose earth and rocks, 2,900 m., July, 1911, *Foote 17;* Ollantaytambo, about 3,000 m., *Cook & Gilbert*, May, 1915, *504, 749, 771a.*

BREUTELIA BRYOCARPA Herzog.

Lucumayo Valley, 1,800–3,600 m., June, 1915, *Cook & Gilbert, 1320a.*

A few stems with one capsule were found mixed in with *Breutelia tomentosa*. This is evidently the same species as that collected by Weddell in Peru and named, apparently in manuscript only, *Bartramia nutans* by Montagne. It is also the same as my Bolivian collection, No. 2825, referred to *Breutelia nutans* (Mont.).

BREUTELIA TOMENTOSA (Sw.) Schimp.

San Miguel, Urubamba Valley, about 1,800 m., May, 1915, *Cook & Gilbert 988;* Lucumayo Valley, 1,800–3,600 m., June, 1915, *Cook & Gilbert 1320.*

POGONATUM CAMPYLOCARPUM C. Müll.

Lucumayo Valley, 1,800–3,600 m., June, 1915, *Cook & Gilbert 1322.*

POGONATUM POLYCARPUM (Schimp.) Broth.

Araranca, south side of La Roya Pass, about 4,100 m., April, 1915, *Cook & Gilbert 177 and 182.*

POLYTRICHUM ANTILLARUM Rich.

Torontoy, Urubamba Valley, about 2,400 m., June, 1915, *Cook & Gilbert 1194;* Lucumayo Valley, 1,800–3,600 m., on wet earth, June, 1915, *Cook & Gilbert 1318.*

HEDWIGIA ALBICANS (Web.) Lindb.

Temple of Viracocha, near Tinta, about 3,500 m., April, 1915, *Cook & Gilbert 204;* Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 501.*

HEDWIGIDIUM IMBERBE (Sm.) B.S.G.

Urubamba, on rocks, 2,900 m., July, 1911, *Foote 18;* Ollantaytambo, 2,750 m., July, 1911, *Foote 19;* Temple of Viracocha, near Tinta, about 3,500 m., April, 1915, *Cook & Gilbert 204a.*

BRAUNIA CANESCENS Schimp.

Near Calca, on rock, April, 1915, *Cook & Gilbert 245;* Ollantaytambo, about 3,000 m., April and May, 1915, *Cook & Gilbert 473, 502, and 503.* This species has been considered scarcely distinct from *B. cirrifolia* (Wils.) Jaeg., but it seems to me to be a rather smaller species with more closely imbricate leaves. The leaves also, below the apex of the stem, are broader in the upper part, often slightly obovate, and more abruptly narrowed to the pale apex of blade and hair point. *B. cirrifolia* has leaves rather

lanceolate and gradually narrowed to a yellowish apex and flexuous hair point. *Braunia argentinica* C. Müll. and *B. cirriolia* var. *falcatula* Herzog belong, I should say, under *B. canescens*.

PRIONODON BOLIVIANUS C. Müll.

Torontoy, Urubamba Valley, about 3,600 m., May, 1915, *Hiram Bingham 729*.

SQUAMIDIUM ROTUNDIFOLIUM (Mitt.) Broth.

Above San Miguel, 1,830 m., September, 1911, *Foote 20*.

PILOTRICHELLA VIRIDIS (C. Müll.) Jacq.

San Miguel, Urubamba Valley, 1,800 m., May, 1915, *Cook & Gilbert 919*.

PAPILLARIA IMPONDEROSA (Tayl.) Broth.

Above San Miguel, on moist earth, 1,830 m., September, 1911, *Foote 21*.

METEORIOPSIS REMOTIFOLIA (Hornsch.) Broth.

San Miguel, 1,500–1,830 m., July, 1911, *Foote 22*.

NECKERA EUCARPA Schimp.

Urubamba, on bark, 2,900 m., July, 1911, *Foote 23;* Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 763*.

NECKERA JAMESONI Tayl.

Ollantaytambo, about 3,000 m., on *Alnus*, May, 1915, *Cook & Gilbert 763a*.

NECKERA LINDIGII Hampe.

Lucma, on dead wood, 2,130 m., August, 1911, *Foote 24;* Urubamba, on bark, with *N. eucarpa*, 2,900 m., July, 1911, *Foote 23a*.

POROTRICHUM VALDIVIAE C. Müll.

Ollantaytambo, about 3,000 m., on trunks, May, 1915, *Cook & Gilbert 762a;* apparently the farthest northern station for this species.

ENTODON PLATYGYRIOIDES C. Müll.

Above San Miguel, on rock, 1,830 m., September, 1911, *Foote 25*.

ERYTHRODONTIUM SQUARROSUM (C. Müll.) Par.

Santa Ana, on rock, 912 m., August, 1911, *Foote 26*.

FABRONIA ANDINA Mitt.

Ollantaytambo, on rock, about 3,000 m., May, 1915, *Cook & Gilbert 662;* Urubamba, 2,900 m., July, 1911, *Foote 27;* Ollantaytambo, 2,750 m., July, 1911, *Foote 28.*

FABRONIA POLYCARPA Hook.

Santa Ana, 912 m., August, 1911, *Foote 29.*

CYCLODICTYON AERUGINOSUM (Mitt.) Broth.

Lucma, on dead wood, 2,130 m., August, 1911, *Foote 30.*

RHACOPILUM TOMENTOSUM (Hedw.) Mitt.

Santa Ana, on dead wood, 912 m., August, 1911, *Foote 31, 32;* San Miguel, 1,525 m., September, 1911, *Foote 33.*

LESKEA GRACILLIMA Tayl.

Urubamba, 2,900 m., July, 1911, *Foote 34,* on bark, *35* on rock; Ollantaytambo, on rock, about 3,000 m., May, 1915, *Cook & Gilbert 609a, 663.*

THUIDIUM PERUVIANUM Mitt.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 704, 748.*

HYGROAMBLYSTEGIUM IRRIGUUM (Wils.) Loeske.

Urubamba, on rock, 2,900 m., July, 1911, *Foote 36.* Apparently not before reported for South America. The next nearest known location is, I believe, Guatemala.

Drepanocladus longifolius (Wils.) comb. nov.

Amblystegium longifolium Wils.; Mitten; Jour. Linn. Soc. Bot. 12: 571. 1869.

Temple of Viracocha, near Tinta, about 3,500 m., in a spring, April, 1915, *Cook & Gilbert 216.*

These sterile specimens seem to belong under this species although only known from Patagonia up to the present time.

Hygrohypnum peruviense sp. nov.

Inflorescence unknown: growing in loose mats with irregularly branching stems without radicles, 2–3 cm. long and about 200 μ in diameter, in cross-section showing a distinct central strand and outer walls of about three rows of smaller, thick-walled cells; leaves loosely erect-spreading, more or less secund, rather broadly ovate-acute, somewhat cymbiform, 1.5–2 mm. long, and nearly or quite entire; costa stout, 80 μ wide or more at the base, simple

and extending about three fourths up the leaf or shorter and dividing into two to five branches; leaf-cells all elongate, prosenchymatose and mostly slightly sinuous, with rather thin walls, the median 5–6 μ wide and 40–60 μ long, the alar usually forming a distinct cluster of broad, short cells either greenish or finally reddish-brown; fruit not found. (PLATE 18, FIGS. 7–12.)

A variety evidently of the above, growing in flowing water, has elongate, hispid, wiry stems, 10–15 cm. long, without leaves below and in habit like *H. Bestii*, except much more slender.

Cuzco, on wet rock, 3,500 m., July, 1911, *Foote 37* (type); Ollantaytambo, about 3,000 m., on rock under spring, May, 1915, *Cook & Gilbert 666* (the variety).

CTENIDIUM MALACODES Mitt.

Ollantaytambo, about 3,000 m., on trunks, May, 1915, *Cook & Gilbert 762b*.

MITTENOTHAMNIUM ANDICOLA (Hook.) Card.

Ollantaytambo, about 3,000 m., on trunks, May, 1915, *Cook & Gilbert 762*.

MITTENOTHAMNIUM OXYSTEGUM (Spruce) Card.

Santa Ana, on rock, 912 m., August, 1911, *Foote 38*.

HYPNUM SCHREBERI Willd.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 748a*.

ECTROPOTHECIUM AERUGINOSUM (C. Müll.) Mitt.

Santa Ana, 912 m., on dead wood, August, 1911, *Foote 39*.

PALAMOCLADIUM LESKEOIDES (Hook.) E. G. Britton.

San Miguel, on rock, 1,830 m., September, 1911, *Foote 40*.

BRACHYTHECIUM ASPERULUM (Hampe) Jaeg.

Ollantaytambo, about 3,000 m., May, 1915, *Cook & Gilbert 753a*.

BRACHYTHECIUM FLACCUM C. Müll.

Huadquinia, on wet earth, 1,530 m., August, 1911, *Foote 41;* Ollantaytambo, about 3,000 m., on trunks, May, 1915, *Cook & Gilbert 762c*.

BRACHYTHECIUM SERICEOVIRENS (C. Müll.) Par.

Ollantaytambo, on rock, 2,750 m., July, 1911, *Foote 42*. Known previously only from Patagonia.

BRACHYTHECIUM STEREOPOMA (Spruce) Jaeg.

San Miguel, on live wood, 1,830 m., July, 1911, *Foote 48*.

RHYNCHOSTEGIUM AQUATICUM (Hampe) Jaeg.

Urubamba, in water, 2,900 m., July, 1911, *Foote 43;* Arequipa, in water, June, 1911, *Foote 44;* Cuzco, on wet rocks, July, 1911, *Foote 45*.

RHYNCHOSTEGIUM CONOPHYLLUM (Tayl.) Jaeg.

Urubamba, on rock, 2,900 m., July, 1911, *Foote 46;* San Miguel, on live wood, 1,830 m., July, 1911, *Foote 47*.

NEW YORK BOTANICAL GARDEN

Explanation of plates 17–20

PLATE 17

Leptodontium integrifolium. 1. Plant about natural size. 2. Perichaetium, × 7. 3. Stem-leaf, × 15. 4. One side of base of leaf, × 115. 5. Median cells of leaf, × 240. 6. Apex of leaf, × 50. 7. Cross-section of leaf, × 150.

Globulina peruviana. 8. Plant about natural size. 9. Plant, × 10. 10. Stem-leaf, × 45. 11. Apex of costa and leaf, × 230. 12. Median cells of leaf, × 230. 13. Basal cells on one side of costa, × 230. 14. Cross-section of stem, × 230. 15. Cross-section of leaf, × 230.

PLATE 18

Tortula lacerifolia. 1. Plant about natural size. 2. Perichaetial leaf, × 25. 3. Upper stem-leaf, × 25. 4. A segment from the leaf-margin, × 130. 5. Base of leaf on one side of costa, × 180. 6. Cross-section of leaf, × 180.

Hygrohypnum peruviense. 7. Plant about natural size. 8. Cross-section of stem, × 130. 9. Basal leaf-cells on one side of costa, × 270. 10, 11. Stem-leaves, × 25. 12. Median leaf-cells, × 270.

PLATE 19

Grimmia rivulariopsis. 1. Fertile and male plant about natural size. 2. Capsule, seta and perichaetial leaf, × 20. 3. Calyptra, × 20. 4. Lid, × 20. 5. Part of peristome and rim of capsule, × 110. 6. Antheridia with leaf, × 20. 7. Upper part of stem leaf, × 180. 8. Stem-leaf, × 18. 9. Median cells of leaf, × 180. 10. Cells in lower part of perichaetial leaf, × 180. 11. Perichaetial leaf, × 18. 12. Median exothecal cells, × 180. 13. Cross-section of stem-leaf, × 180.

PLATE 20

Bryum biforme. 1. Fertile and male plant about natural size. 2. Male plants, × 20. 3. Capsule, moistened, × 8. 4. Upper stem-leaf, × 16. 5. Outer perichaetial leaf, × 16. 6. Upper part of stem-leaf, × 135. 7. Border of leaf and adjoining cells about half way down, × 135. 8. Inner perichaetial leaf, × 16. 9. Stoma, × 135. 10. Median exothecal cells, × 135. 11. Part of peristome, annulus and rim of capsule, × 100.

INDEX TO AMERICAN BOTANICAL LITERATURE

1910-1916

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

This Index is reprinted monthly on cards, and furnished in this form to subscribers at the rate of one cent for each card. Selections of cards are not permitted; each subscriber must take all cards published during the term of his subscription. Correspondence relating to the card issue should be addressed to the Treasurer of the Torrey Botanical Club.

Abbott, F. H. The red rot of conifers. Vermont Agr. Exp. Sta. Bull. 191: 3–20. *pl. 1–3* + *f. 1, 2.* N 1915.
Trametes pini.

Albert, F. Observaciones sobre los bosques de Guindos. Bol. Bosques, Pesca i Caza **3**: 1–320. Je 1915.
Contains considerable information of a botanical nature.

Benedict, H. M. Senile changes in leaves of *Vitis vulpina* L. and other plants. Cornell Agr. Exp. Sta. Mem. **7**: 281–370. *f. 52–58.* Je 1915.

Benedict, R. C. *Nephrolepis.* Standard Cyclopedia of Horticulture. **4**: 2131–2135. *f. 2469–2473.* 15 D 1915.

Benoist, R. Descriptions de Lécythidacées nouvelles de l'amérique méridionale. Notulae Systematicae **3**: 177–180. 1915.
Four new species in *Lecythis* are described.

Berry, E. W. Notes on the ancestry of the beech. Plant World **19**: 68–77. *f. 1, 2.* Mr 1916.

Berry, E. W. Remarkable fossil fungi. Mycologia **8**: 73–79. *pl. 180–182.* 11 Ap 1916.
Three new species are described.

Boyce, J. S. A note on *Cronartium pyriforme.* Phytopathology **6**: 202, 203. 4 Ap 1916.

Bray, W. L. The development of the vegetation of New York State. New York State College of Forestry, Syracuse Univ. Tech. Publ. 3: 1–186. *f. 1–52 + map.* [F 1916.]

Britton, N. L. *Cassia polyphylla.* Addisonia **1**: 3, 4. *pl. 2.* 31 Mr 1916.

Britton, N. L. *Nopalea Auberi.* Addisonia **1**: 19, 20. *pl. 10.* 31 Mr 1916.

Brown, N. E. *Aristolochia Lawrenceae.* Curt. Bot. Mag. IV. **12**: *pl. 8650.* Mr 1916.
A plant from Argentine.

Brown, N. E. *Chamaedorea nana.* Curt. Bot. Mag. IV. **12**: *pl. 8652.* Mr 1916.
A plant from Costa Rica.

Chapman, G. H. Effect of colored light on the mosaic disease of tobacco. Science II. **43**: 537, 538. 14 Ap 1916.

Clausen, R. E., & Goodspeed, T. H. Hereditary reaction-system relations—an extension of Mendelian concepts. Proc. Nat. Acad. Sci. **2**: 240–244. Ap 1916.

Conzatti, C. Comentario al plan general de la clasificación de los vegetales. Bol. Direc. Estud. Biol. **1**: 281–283. Ja 1916.

Cook, M. T. Common diseases of beans. New Jersey Agr. Exp. Sta. Circ. 50: 1–4. 1916.

Cook, M. T., & Helyar, J. P. Diseases of grains and forage crops. New Jersey Agr. Exp. Sta. Circ. 51: 1–8. 1916.

Cook, O. F., & Doyle, C. B. Germinating cocoanuts. Jour. Heredity **7**: 148–157. *f. 1–6.* Ap 1916.

Cooper, W. S. A catalogue of the flora of Isle Royale, Lake Superior. Ann. Rep. Michigan Acad. Sci. **16**: 109–131. [1915.]

Crabill, C. H. Note on apple root-rot in Virginia. Phytopathology **6**: 159–161. *f. 1.* Ap 1916.

Craib, W. G. *Sophora macrocarpa.* Curt. Bot. Mag. IV. **12**: *pl. 8647.* F 1916.
A plant from Chile.

Crocker, W. Mechanics of dormancy in seeds. Am. Jour. Bot. **3**: 99–120. Mr 1916.

Dearness, J. New or noteworthy species of fungi. Mycologia **8**: 98–107. 11 Ap 1916.
Twenty-five new species are described.

Detwiler, S. B. Douglas fir. Identification and characteristics. Am. Forestry **22**: 67–69. F 1916. [Illust.]

Dodge, C. K. The flowering plants, ferns, and fern allies growing without cultivation in Lambton County, Ontario. Ann. Rep. Michigan Acad. Sci. **16**: 132–200. [1915.]

Doolittle, S. P. A new infectious mosaic disease of cucumber. Phytopathology **6**: 145–147. 4 Ap 1916.

Fawcett, H. S. Report of former plant pathologist. Ann. Rep. Florida Agr. Exp. Sta. **1912**: lxiv–xcii. Mr 1913.
Includes further report on stem-end rot, *Phomopsis citri*.

Fred, E. B. Relation of carbon bisulphide to soil organisms and plant growth. Jour. Agr. Research **6**: 1–20. *pl. 1, 2.* 3 Ap 1916.

Gates, R. R. On pairs of species. Bot. Gaz. **61**: 177–212. *f. 1–12.* 15 Mr 1916.

Gilbert, W. W. Cucumber mosaic disease. Phytopathology **6**: 143, 144. *pl. 5.* 4 Ap 1916.

Gregory, C. T. The taxonomic value and structure of the peach leaf glands. Cornell Agr. Exp. Sta. Bull. 365: 183–224. *pl. 1–9* + *f. 37, 38.* N 1915.

Grossenbacher, J. G. Sour scab of *Citrus* in Florida, and its prevention. Phytopathology **6**: 127–142. *f. 1–4.* 4 Ap 1916.

Harper, E. T. Two parasitic mushrooms. Mycologia **8**: 65–72. *pl. 177–179.* 11 Ap 1916.

Harter, L. L. Sweet-potato diseases. U. S. Dept. Agr. Farmers' Bull. 714: 1–26. *f. 1–21.* 11 Mr 1916.

Herriot, W. Data on seed maturity of some Ontario plants. Ottawa Nat. **29**: 151–157. 10 Ap 1916.

Higgins, B. B. Plum wilt, its nature and causes. Georgia Agr. Exp. Sta. Bull. 118: 1–29. *f. 1–25.* Ja 1916.

Hill, J. B. A method for the dehydration of histological material. Bot. Gaz. **61**: 255, 256. 15 Mr 1916.

Holden, R. Hybrids of the genus *Epilobium*. Am. Nat. **50**: 243–247. *f. 1–4.* Ap 1916.

Howitt, J. E., & McCubbin, W. A. An outbreak of white pine blister rust in Ontario. Phytopathology **6**: 182–185. 4 Ap 1916.

Howitt, J. E., & Stone, R. E. A troublesome disease of winter tomatoes. Phytopathology **6**: 162–166. 4 Ap 1916.

Humphrey, C. J. Laboratory tests on the durability of American woods—I. Flask tests on conifers. Mycologia **8**: 80–92. *pl. 183.* 11 Ap 1916.

Jacobson, C. A. Water hemlock (*Cicuta*). Nevada Agr. Exp. Sta. Tech. Bull. 81: 1–46. *f. 1–10.* Mr 1915.

Jagger, I. C. Experiments with the cucumber mosaic disease. Phytopathology **6**: 148–151. 4 Ap 1916.

Johnson, J. Resistance in tobacco to the root-rot disease. Phytopathology **6**: 167–181. *f. 1–6.* 4 Ap 1916.

Johnston, J. R. Causa de la enfermedad elamada pudricion del cogollo del cocotero. Cuba Estac. Exp. Agron. Bull. 27: 1–106. *pl. 1–15.* Ap 1915.

Jones, D. F. Natural cross-pollination in the tomato. Science II. **43**: 509, 510. 7 Ap 1916.

Kirkwood, J. E. Bisporangiate cones of *Larix*. Bot. Gaz. **61**: 256, 257. *f. 1.* 15 Mr 1916.

Kopeloff, N., Lint, H. C., & Coleman, D. A. A new method of separating fungi from *Protozoa* and bacteria. Bot. Gaz. **61**: 247–250. 15 Mr 1916.

Kroeber, A. L. Floral relations among the Galapagos Islands. Univ. Calif. Publ. Bot. **6**: 199–220. 10 Mr 1916.

Land, W. J. G. Chloroform as a paraffin solvent in the imbedding process. Bot. Gaz. **61**: 251–253. 15 Mr 1916.

Létourneau, F. Encore une plaie! Le Naturliste Canadien. **42**: 113–118. F 1916.

Includes notes on "La brûlure" (*Bacillus amylovorus*).

Lloyd, C. G. Mycological notes 39: 525–540. *f. 718–742.* D 1915.

Includes notes on several species of *Cordyceps;* the genus *Mucronella; Polyporus Mylittae; Xylaria axifera, Cladoderris floridana; Exidia; Sebacina dendroidea; Strobilomyces pallidus.*

Lloyd, F. E. Abscission in *Mirabilis jalapa*. Bot. Gaz. **61**: 213–230. *pl. 13* + *f. 1, 2.* 15 Mr 1916.

McAllister, F. The morphology of *Thallocarpus Curtisii*. Bull. Torrey Club **43**: 117–126. *pl. 4.* 14 Ap 1916.

McMurphy, J. A *Phytophthora* on oats. Science II. **43**: 534. 14 Ap 1916.

Meinecke, E. P. Forest pathology in forest regulation. U. S. Dept. Agr. Bull. 275: 1–62. 7 Ap 1916.

Meyer, R. Einiges über *Echinocactus arizonicus* R. E. Kunze. Monats. Kakteenk. **26**: 12–14. Ja 1916.

Murrill, W. A. An attractive species of *Melanoleuca* from Oregon. Mycologia **8**: 113. 11 Ap 1916.
Melanoleuca olivaceiflora sp. nov.

Nash, G. V. *Begonia Cowellii.* Addisonia **1**: 9, 10. *pl. 5.* 31 Mr 1916.
A new species.

Nash, G. V. *Columnea gloriosa.* Addisonia **1**: 13, 14. *pl. 7.* 31 Mr 1916.

Nash, G. V. *Fouquieria formosa.* Addisonia **1**: 15, 16. *pl. 8.* 31 Mr 1916.

Nash, G. V. *Maxillaria ringens.* Addisonia **1**: 17, 18. *pl. 9.* 31 Mr 1916.

Nash, G. V. *Rhododendron carolinianum.* Addisonia **1**: 1, 2. *pl. 1.* 31 Mr 1916.

Nash, G. V. *Robinia Kelseyi.* Addisonia **1**: 5, 6. *pl. 3.* 31 Mr 1916.

Osterhout, W. J. V. The nature of mechanical stimulation. Proc. Nat. Acad. Sci. **2**: 237–239. *f. 1.* Ap 1916.

Peltier, G. L. *Sclerotium Rolfsii* in Illinois. Phytopathology **6**: 201, 202. 4 Ap 1916.

Pittier, H. New or noteworthy plants from Colombia and Central America—5. Contr. U. S. Nat. Herb. **18**: i–ix + 143–171. *pl. 57–80 + f. 88–97.* 3 Mr 1916.
Fourteen new species and one new genus (*Bombacopsis*) are described.

Pool, V. W., & McKay, M. B. Climatic conditions as related to *Cercospora beticola.* Jour. Agr. Research **6**: 21–60. *pl. 3, 4 + f. 1–10.* 3 Ap 1916.

Reichert, E. T. The specificity of proteins and carbohydrates in relation to genera, species and varieties. Am. Jour. Bot. **3**: 91–98. Mr 1916.

Rhoads, S. N. Botanica neglecta. William Young, Jr. (of Philadelphia) "Botaniste de Pensylvanie" and his long-forgotten book, being a facsimile reprint of his "Catalogue d'Arbres, Arbustes et Plantes Herbacées d'Amérique." i–xi + 1–55. Ap 1916.
Includes a prefatory account of the author and critical notes by the editor.

Riddle, L. W. The lichens of Bermuda. Bull. Torrey Club **43**: 145–160. 14 Ap 1916.
Includes description of seven new species.

Roe, M. L. The development of the conceptacle in *Fucus*. Bot. Gaz. **61**: 231–246. *pl. 14–17*. 15 Mr 1916.

Rose, J. N. *Echeveria setosa*. Addisonia **1**: 11. *pl. 6*. 31 Mr 1916.

Rose, J. N. *Pachyphytum longifolium*. Addisonia **1**: 7, 8. *pl. 4*. 31 Mr 1916.

Rydberg, P. A. Phytogeographical notes on the Rocky Mountain region—IV. Forests of the subalpine and montane zones. Bull. Torrey Club **42**: 11–25. 29 Ja 1915.

Safford, W. E. The botanical identity of *Lignum nephriticum*. Science II. **43**: 432. 24 Mr 1916.

Safford, W. E. *Eysenhardtia polystachya*, the source of the true *Lignum nephriticum mexicanum*. Jour. Washington Acad. Sci. **5**: 503–517. *f. 1, 2*. 19 Au 1915.

Safford, W. E. A remarkable new *Eysenhardtia* from the west coast of Mexico. Jour. Washington Acad. Sci. **6**: 133, 134. *f. 1*. 19 Mr 1916.

Eysenhardtia Olivana sp. nov.

Scott, C. A. Trees for Kansas. Kansas Agr. Exp. Sta. Circ. 55: 1–19. Ja 1916. [Illust.]

Scott, W. M. Fighting orchard insects and diseases. Am. Fruit-Grower **2**: 3–5. Mr 1916. [Illust.]

Seaver, F. J. The earth-inhabiting species of *Ascobolus*. Mycologia **8**: 93–97. *pl. 184*. 11 Ap 1916.

Three new species are described.

Shaw, W. R. *Besseyosphaera*, a new genus of the Volvocaceae. Bot. Gaz. **61**: 253, 254. 15 Mr 1916.

Shreve, F. The weight of physical factors in the study of plant distribution. Plant World **19**: 53–67. Mr 1916.

Small, J. K. Exploration in southern Florida in 1915. Jour. N. Y. Bot. Gard. **17**: 37–45. *pl. 166–168*. Mr 1916.

Smith, C. O. Cottony rot of lemons in California. Calif. Agr. Exp. Sta. Bull. 265: 237–258. *f. 1–11*. Ja 1916.

Sclerotinia libertiana.

Smith, C. O. Preliminary studies on the resistance of *Prunus* to artificial inoculation with *Bacterium tumefaciens*. Phytopathology **6**: 186–194. *pl. 6*. 4 Ap 1916.

Spaulding, P. The blister rust disease of white pine. Am. Forestry **22**: 97, 98. *f. A–D*. F 1916.

Stapf, O. *Lupinus Chamissonis.* Curt. Bot. Mag. IV. **12**: *pl. 8657.* Ap 1916.

A plant found in California.

Stevens, H. E. Report of plant pathologist. Ann. Rep. Florida Agr. Exp. Sta. 1914: lvii–lxxiv. Ap 1915.

Includes report of work on gummosis and melanose.

Stevens, N. E. Recovery of a tree from a lightning stroke. Phytopathology **6**: 204–206. 4 Ap 1916.

Stewart, V. B., & Leonard, M. D. Further studies in the rôle of insects in the dissemination of fire blight bacteria. Phytopathology **6**: 152–158. 4 Ap 1916.

Sydow, H., & Sydow, P. Fungi amazonici a cl. E. Ule lecti. Ann. Myc. **14**: 65–97. 20 F 1916.

Includes six new genera and 60 new species in Uredinaceae (14), Ustilagineae (1), Ascomycetes (38), and Fungi imperfecti (7).

Transeau, E. N. The periodicity of fresh water algae. Am. Jour. Bot. **3**: 121–133. *f. 1–3.* Mr 1916.

Weatherwax, P. Morphology of the flowers of *Zea Mays.* Bull. Torrey Club **43**: 127–144. *pl. 5, 6 + f. 1–4.* 14 Ap 1916.

Weir, J. R., & Hubert, E. E. A serious disease in forest nurseries caused by *Peridermium filamentosum.* Jour. Agr. Research **5**: 781–785. 24 Ja 1916.

Wells, B. W. A survey of the zoocecidia on species of *Hicoria* caused by parasites belonging to the Eriophyidea and the Itonididae (Cecidomyiidae). Ohio Jour. Sci. **16**: 37–57. *pl. 1, 2.* 20 D 1915.

Wester, P. J. Hybridization of Annonas. Philippine Agr. Rev. 7: 177–181. *pl, 5–10.* 1915.

Wester, P. J. Myrtaceous possibilities for the plant breeder. Philippine Agr. Rev. 7: 207–215. 1915.

Whetzel, H. H., & Rosenbaum, J. The *Phytophthora* rot of apples. Phytopathology **6**: 89, 90. F 1916.

Wieland, G. R. Was the *Pterophyllum* foliage transformed into leafy blades of dicotyls? Am. Jour. Sci. **38**: 451–460. *f. 1–3.* N 1914.

Wilson, G. W. A new European species of *Peronospora.* Ann. Myc **8**: 185–187. 1910.

Peronospora Ononidis sp. nov.

Wilson, G. W. An anomalous hickory-nut. Proc. Iowa Acad. Sci. **22**: 133. 1915.

Wilson, G. W. An *Exobasidium* on *Armillaria*. Proc. Iowa Acad. Sci. **22**: 134. 1915.

Wolf, F. A. Further studies on peanut leafspot. Jour. Agr. Research **5**: 891–902. 7 F 1916.

Wolf, F. A. *Citrus* canker. Jour. Agr. Research **6**: 69–100. *pl. 8–11 + f. 1–8.* 10 Ap 1916.

Woodward, R. W. *Bidens connata petiolata*. Rhodora **17**: 234. 6 Ja 1916.

Woolery, R. Meiotic divisions in the microspore mother-cells of *Smilacina racemosa* (L.) Desf. Ann. Bot. **29**: 471–482. *pl. 22+ f. 1.* O 1915.

Wright, C. H. *Eucharis Lowii*. Curt. Bot. Mag. IV. **12**: *pl. 8646.* F 1916.
Found in western tropical America.

Wylie, R. B. A hybrid ragweed. Proc. Iowa Acad. Sci. **22**: 127, 128. *pl. 21.* 1915.

Yasui, K. Studies of *Diospyros Kaki*—I. Bot. Gaz. **60**: 362–373. *pl. 12, 13+f. 1–11.* 15 N 1915.

Yates, H. S. The comparative histology of certain Californian Boletaceae. Univ. Calif. Publ. Bot. **6**: 221–274. *pl. 21–24.* 25 F 1916.

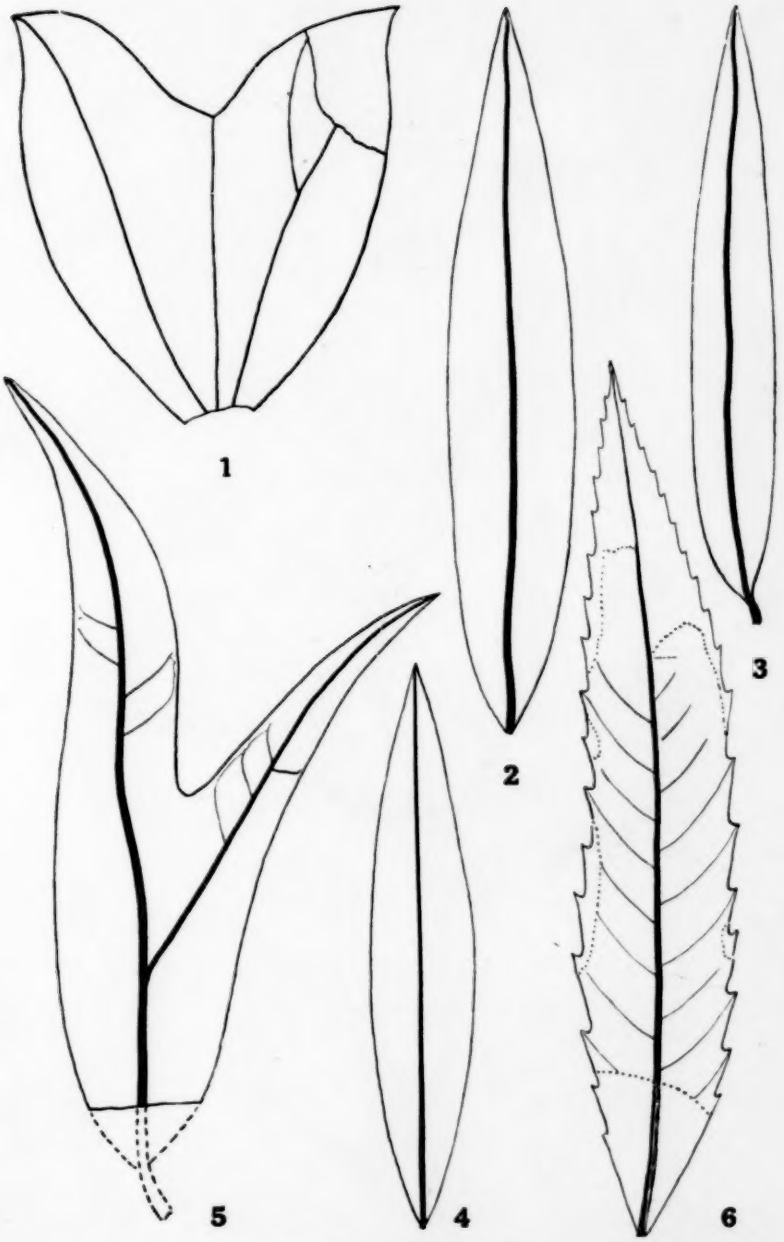
Young, E. Studies in Porto Rican parasitic fungi—II. Mycologia **8**: 42–46. Ja 1916.
Six new species of *Cercospora* are described.

Young, R. A., & Popenoe, P. Saving the kokio tree. Jour. Heredity **7**: 24–28. *f. 6, 7.* 29 D 1915.

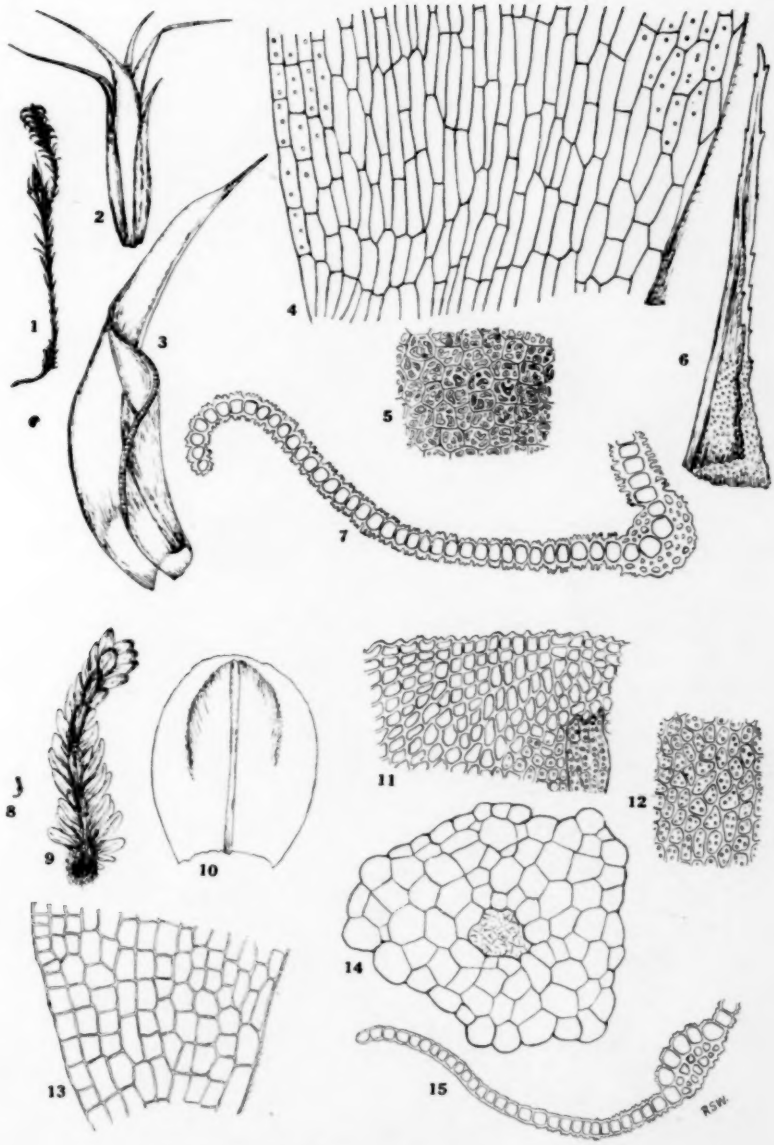
Zahlbruckner, A. Neue Arten und Formen der Lobelioideen. I. Repert. Sp. Nov. **13**: 528–537. 30 Je 1915.

Zahn, K. H. Hieracia domingensia. Bot. Jahrb. **52**: 272. 16 Mr 1915; 273–276. 3 Au 1915.

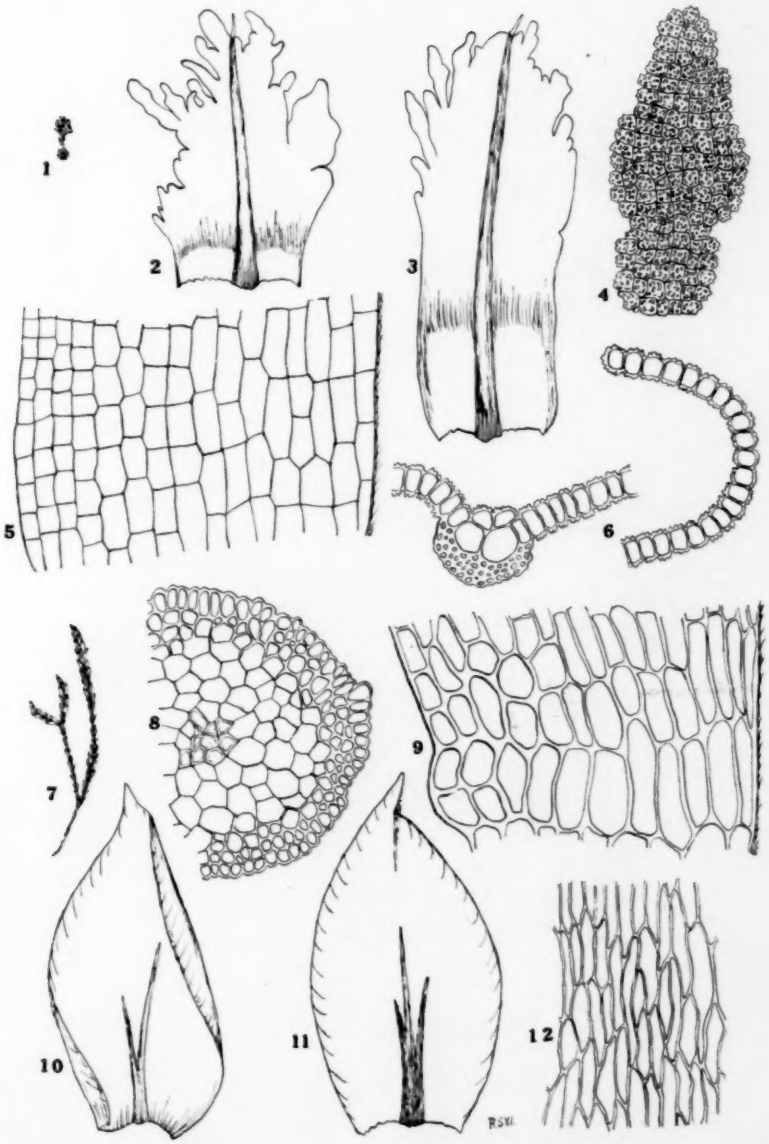
Zeller, S. M., & Neikirk, A. Gas exchange in the pneumatocyst of *Nereocystis luetkeana* (Mertens) P. & R. Puget Sound Marine Sta. Publ. **1**: 25–30. 1 Jl 1915.



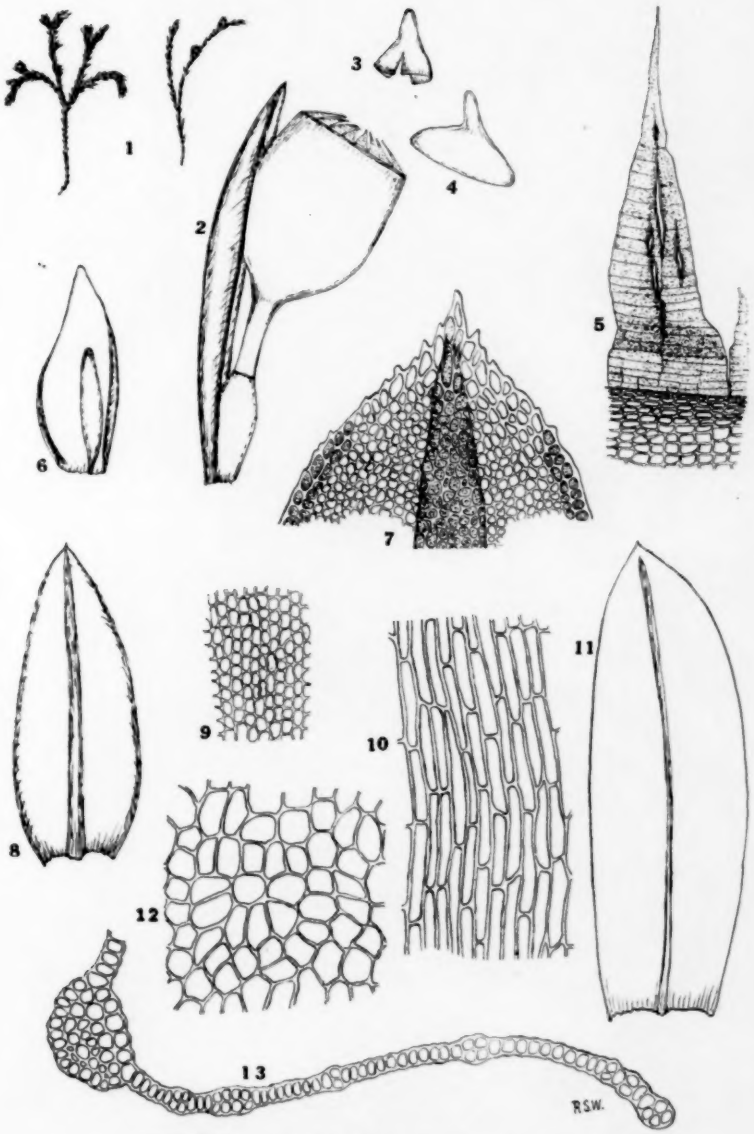
1. BAUHINIA RIPLEYENSIS BERRY
2–4. EUGENIA (?) ANCEPS BERRY
5. STERCULIA SNOWII TENNESSEENSIS BERRY
6. DRYOPHYLLUM GRACILE DEBEY



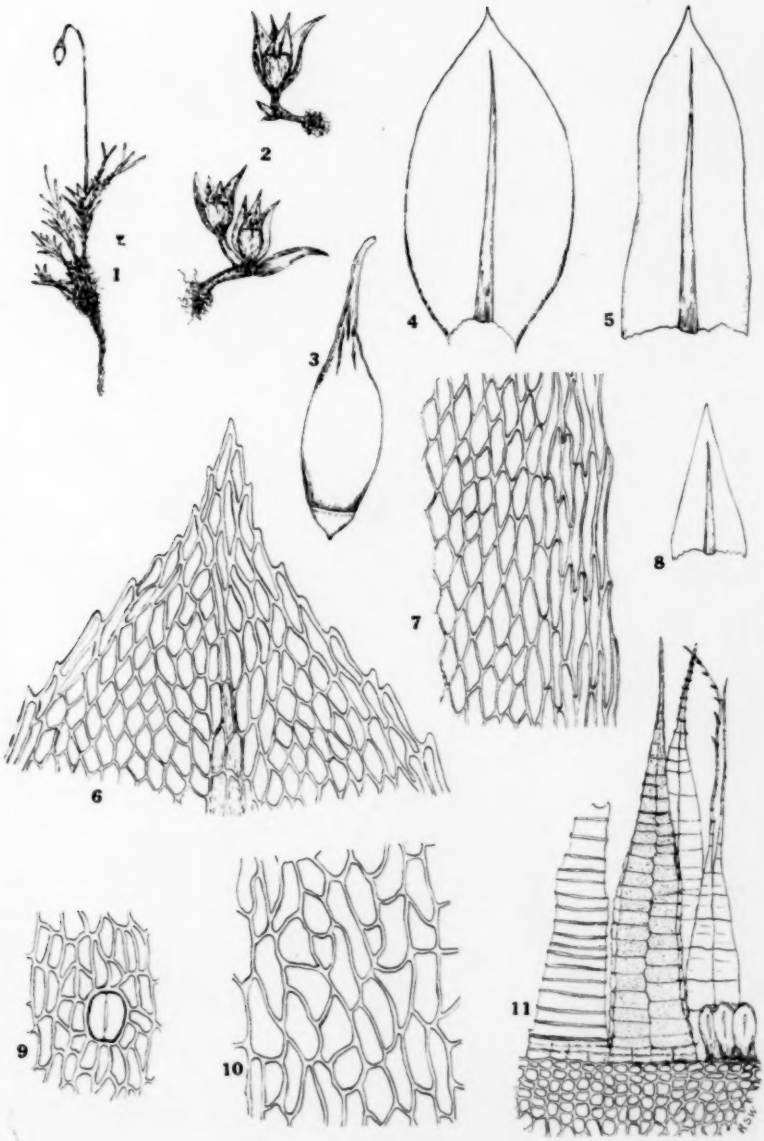
1–7. LEPTODONTIUM INTEGRIFOLIUM R. S. WILLIAMS
8–15. GLOBULINA PERUVIANA R. S. WILLIAMS



1–6. TORTULA LACERIFOLIA R. S. WILLIAMS
7–12. HYGROHYPNUM PERUVIENSE R. S. WILLIAMS



GRIMMIA RIVULARIOPSIS R. S. WILLIAMS



BRYUM BIFORME R. S. WILLIAMS